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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII CLEVELAND, OHIO, FEBRUARY 25, 1904 NUMBER 8

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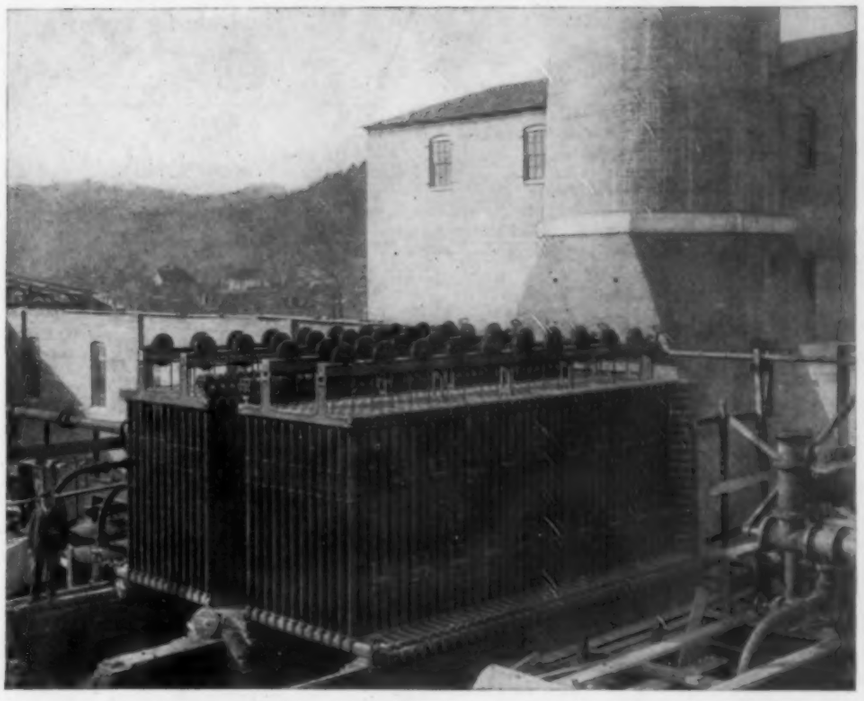

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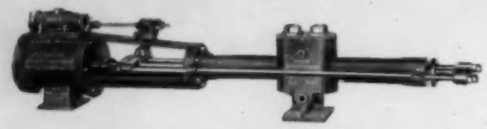

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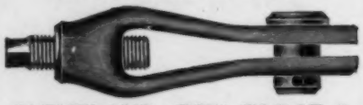

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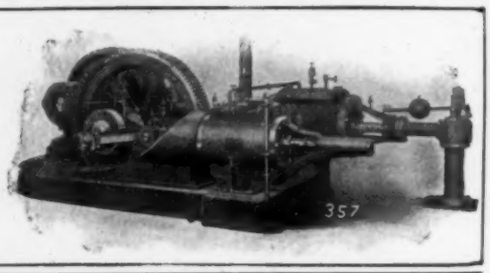

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, FEBRUARY 25, 1904 NUMBER 8

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The large steel companies have made some good additions to their order books in the past week, and in some cases new business has exceeded mill shipments. Railroad buying is undoubtedly better. The purchases of rails announced in this column two weeks ago were followed by contracts for track material, and there has been a fair run of orders for new cars. It can no longer be said that the railroads are not a factor in the steel market. This week there are inquiries from two lines for 125,000 tons of rails, and contracts are expected to be made at an early day. The steel car companies have booked additional orders, and while the total of orders for steel and wooden cars placed in January was less than 15 percent of the business in January, 1903, the disparity between the February records promises to be less marked. In the Chicago market the demand for angle bars, spikes, splices and track bolts has been a feature in the past week, and from all centers of railroad buying there is a better report. Definite developments in structural lines are still lacking, though Chicago reports projects practically assured that will require 20,000 tons of shapes, and at New York the initial steps have been taken in construction that will call for a similar amount. One railroad inquiry for bridge work the past week represents 6,000 tons.

The bar trade has been one of the most satisfactory features of the situation. Demand for the past month has been of good proportions, both in iron and steel, many of the contracts running to the middle of the year and some to the end of 1904. Agricultural implement and machinery manufacturers are operating on a scale that indicates a good expectation for this year. For the most part bar iron is sold at $1 to $2 below the price of steel. The steel sheet trade has been marked by irregularity, and 2.20c Pittsburg for No. 27 is not maintained, though this is the basis of the prices recently formulated by most of the independent producers. In the tin plate trade the agreement of the men at certain plants to deposit 25 percent of their wages with the company with the understanding that some of the amount would be repaid under a profit-sharing arrangement, if any profit were made, has caused a stir, and may lead to important developments in the industry. The plan has worked a practical reduction of wages in the middle of the scale year, and is likely to spread, with important results as affecting the hold of the Amalgamated Association on the tin plate industry.

The record of the pig iron market is still one of low prices and limited tonnage. The Bessemer Pig Iron Association held a meeting in Cleveland in the past week and convassed the situation, which has little of immediate promise. That the steel corporation will be a buyer of Bessemer pig iron is considered a remote contingency. Any purchase that might be made in the first half of the year, it is believed, would be of small proportions and only at a price that would make piecing-out purchases for Northern and Eastern Ohio steel works preferable to paying freight on pig iron from Pennsylvania furnaces of the corporation. The foundry pig iron market reflects the resumption of competition between Southern and Northern furnaces. While some Southern furnaces quote $9.50 for No. 2 iron, business has been done at $9, Birmingham, and Eastern advices intimate that this has been shaded in that section. There is practically no forward buying and consumers are acting on the belief that the market will continue for some time in their favor. Central Western furnaces have made sales ranging from $12 to $12.25 at furnace for No. 2 and $12 has been shaded in the sharp scramble for the more desirable business.

The Lake Superior ore situation presents no new developments. Another meeting of producers and selling firms will be held in Cleveland on Feb. 29, but there is only remote possibility of an agreement for 1904.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, Feb. 24.

A slight improvement in finished lines is noted by the leading steel mills in the past week and the outlook for a good demand the remainder of the first half of the year is encouraging. The situation in bars is especially gratifying and less and less cutting is noted in bar iron from the West where the market has ruled about $2 per ton below steel bars. Several large orders for steel cars have been booked by both the Pressed Steel Car and Standard Steel Car companies and specifications for plates have correspondingly increased. In rails, two leading roads are figuring on contracts that will call for the delivery of 125,000 tons and it is expected that the orders will be placed almost daily. On March 1 the new tariffs on steel rails will go into effect. This new list was made necessary owing to the removal of the rail mill of the Lackawanna Steel Co. from Scranton, Pa., to Buffalo, N. Y. Many irregularities in the list have also been adjusted, and the tariffs are more satisfactory to the mills than any issued heretofore.

Accompanying this tariff sheet is the announcement of the Central Freight Association that special freight rates on steel for export which became effective last November would be withdrawn on Aug. 31. By some of the steel manufacturers this action is considered to be due to the refusal of the rail mills to reduce the price of standard sections for delivery this year. The freight reduction on billets, sheet and tin bars, merchant bars, etc., amounted to 85 cents a ton from Pittsburg to the seaboard and many thousand tons of steel have been shipped abroad since this reduction was allowed. Inasmuch as the date for the withdrawal of the special tariff is still six months off it is possible that some agreement may be entered into for its continuation.

On wire nails and wire products, the advance of $1 a ton announced in these columns two weeks ago is effective, despite statements to the contrary. The advance was made to all except the leading jobbing interests, and as they had all purchased their requirements for the spring trade it did not affect them. However, this advance will no doubt be made to cover their next purchases. A meeting of the shafting manufacturers was held in this city last week, but prices were not discussed. The manufacturers in attendance reported that the market is improving and that general conditions are encouraging.

On No. 2 foundry iron lower quotations are now made in this market. Special brands, which usually are held from 25 to 50 cents above the prevailing market, are being sold at $13.35, Pittsburg, while a few Valley furnaces are quoting on the basis of $12, Valley, or $12.85, Pittsburg, 2,000 tons having been sold at this price, but not for local delivery. A meeting of the ore producers will be held next Monday in Cleveland. It is understood that the attitude of the leading steel companies and of the merchant ore men is unchanged, and an agreement to disagree is expected.

The Alcania Co., operating a tin plate plant at Avonmore, Pa., will put into effect this week a profit sharing plan, which practically amounts to a reduction of 25 percent from the Amalgamated scale. Other independent tin plate manufacturers are anxious to adopt the same plan, and as the Amalgamated Association cannot prevent its adoption under its constitution, there is no telling how far it will spread. This is the forerunner of the breaking away from the Amalgamated Association of not only the independent tin plate but sheet mills as well, who find their only salvation in still further reducing wages in order to meet the present competition.

Pig Iron.—The market is very quiet and buying is limited to immediate requirements almost entirely. On No. 2 foundry several Valley furnaces are quoting $12 at the furnace, but none of this iron has yet been sold in this district. One lot of 2,000 tons for nearby delivery, however, was sold at this price. Southern furnaces are now quoting on the basis of $9.50 for No. 2 Birmingham district which would be $13.85, delivered, Pittsburg. It is needless to say that no iron is being purchased in this market at this price. Some Bessemer and a small tonnage of basic are moving at prices ranging from $12.60 to $12.75, Valley furnaces. Gray forge is held at $12.75 to $13, Pittsburg, but when local mills come into the market again it is probable that these prices will be shaded to some etexnt. We make the following quotations:

Bessemer, Valley	$12 50 to 12 75
Bessemer, Pittsburg	13 35 to 13 60
No. 1 Foundry	13 35 to 13 60
No. 2 Foundry	13 35 to 13 85
Gray Forge, Pittsburg	12 75 to 13 00
Chilled Basic, Valley	12 50 to 12 75
Chilled Basic, Pittsburg	13 35 to 13 60

Steel.—Several 500 and 1,000-ton lots of billets have been placed during the week at pool prices, although one large independent company adhering to these quotations has lost all the business it has quoted on during the past four or five weeks. Mills not members of the association are shading prices and there are indications that some of the business taken at regular quotations by the mills will let the consumer out at less than the regular price. Agreed quotations are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon, $1 advance and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30, Pittsburg.

Ferro-Manganese.—We note the sale of 100 tons of English ferro at $43.50, Pittsburg.

Muck Bar.—Demand for muck bar is not heavy and neutral muck is held at $26, Pittsburg, while lower grades are held at $25.

Skelp.—Demand for both iron and steel skelp is good, although the quotations that are being made on the latter are rather low. Grooved steel is held at 1.30c to 1.35c, while sheared is quoted at 1.35c to 1.40c. Grooved iron is held at 1.45c to 1.50c, and sheared at 1.55c to 1.60c.

Spelter.—The spelter market has been more active during the past week and prime Western grades are held at 4.85c to 4.90c.

Rails and Track Material.—Tariffs on rails, which equalize many irregularities and which fix the rates for the Lackawanna Steel Co., at Buffalo, N. Y., will become effective on March 1. Two leading railroad interests are in the market for 125,000 tons of rails for delivery this year and the orders, it is believed, will be placed this week. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 to 40 pounds, $23 to $24. Track material: Spikes, 1.70c to 1.75c.

Plates.—Specifications on plates are somewhat heavier this week, due to the placing of several large steel car orders. The consumption of plates by leading structural fitters is not heavy at present, however. We quote: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Bars.—Demand for iron and steel bars is increasing and all the mills report heavy specifications, while the new business is fully up to expectations following the recent depression. Hoops and bands are still being shaded, hoops selling as low as 1.35c, while bands have sold at 1.20c to 1.25c. Bar quotations are as follows: Bessemer steel bars, 1.30c; open-hearth, 1.40c; plow beams and cultivator beams, 1.30c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.40c; common bar iron, 1.30c to 1.35c, Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Sheets.—While a few mills are shading the list that is being quoted by nearly all the independents and the American Sheet & Tin Plate Co. it is not sufficient to disturb the trade to any great extent. New business in sheets is increasing rapidly, while on tin plate the present season promises to eclipse any in the history of the trade. Black sheets, one pass, are quoted as follows: No. 8, 1.80c to 1.85c; No. 9, 1.85c to 1.90c; Nos. 12-14, ..c; Nos. 15-17, 2c; Nos. 18-21, 2.05c; Nos. 22-24, 2.10c; Nos. 25-26, 2.15c; No. 27, 2.20c; No. 28, 2.30c; No. 29, 2.60c; No. 30, 2.70c. Galvanized: Nos. 12-17, 2.40c; Nos. 18-21, 2.55c; Nos. 22-24, 2.70c; Nos. 25-26, 2.90c; No. 27, 3.10c; No. 28, 3.30c; No. 29, 3.70c; No. 30, 4.10c.

Merchant Steel.—A meeting of the shafting manufacturers was held in this city last week, but no change in quotations was discussed. The market was reported to be improving, with a good outlook for the spring trade. Cold rolled and ground shafting is quoted 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.50c, base; spring steel, 1.90c to 2c; toe calk, 1.85c, base. Tool steel is quoted 6 cents and upwards, according to the grade.

Wire and Wire Nails.—While the recent advance on wire and wire nails by the leading interest does not affect the official jobbing interests, the advance has been made to consumers and retailers amounting to $1 per ton. It does not affect the jobbers, for they are not buying, but when they come into the market again it is expected that they will pay this advance. We make the following quotations: Wire nails, carload lots, to jobbers, f. o. b. cars Pittsburg, $1.90 base; plain wire, carload lots, $1.80, base; barb wire, carload lots, $2.20, base; staples, carload lots, $2.05, keg. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.70, and less than carload lots, $1.75, f. o. b., Pittsburg, plus freight to point of destination. Terms, 60 days less 2 percent off in 10 days.

Pipes and Tubes.—Demand not only for merchant pipe, but line pipe and boiler tubing continues strong, and despite the fact that February is usually an off month, the demand is very heavy and the tonnage thus far booked is equal to that booked last year. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch	69	59	66	56
½ inch	72	62	69	59
¾ to 6 inch	76	66	73	63
7 to 12 inch	71	61	68	58

EXTRA STRONG, PLAIN ENDS.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ to 8 inch	68	58	64	54

DOUBLE EXTRA STRONG, PLAIN ENDS.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ to 8 inch	60	50	56	46

BOILER TUBES.

	Steel.	Iron.
1 to 1½ inch	42½	39
1¾ to 2¼ inch	55½	38
2½ inch	58	43
2¾ to 5 inch	64½	50½
6 to 12 inch	55½	38

Old Material.—There has been some buying of heavy melting stock by steel mills, while iron mills are buying considerable scrap. While the tonnage of heavy material is limited, low grade scrap is being offered in large volumes. Our quotations, gross tons, are revised as follows: Heavy melting scrap, $13.50 to $14.00; low phosphorus scrap, $14 to $14.50; old steel rails, $13.50 to $14; sheet scrap, $8 to $8.50; No. 1 wrought, $13.50; cast borings, $5.25 to $5.50; wrought iron turnings, 9.50 to $10.

Coke.—Operators in the Connellsville region are experiencing much difficulty in securing box cars for the shipment of foundry coke, while open top cars have also been scarce the past few days. The demand for coke for prompt shipment is heavy and slightly better than the ruling prices can be obtained on such orders. Connellsville furnace coke is held at $1.45 to $1.60, while strictly Connellsville foundry is held at prices ranging from $2 to $2.50. The production of the upper and lower regions for the week ending Saturday, Feb. 13, amounted to 208,916 tons, a slight gain over the production of the previous week.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, Feb. 23.

For all forms of finished iron and steel, there is a good demand in this market. On lighter materials, such as sheets, hoops and track supplies, some of the trading has been at the expense of prices, but only in instances where a desirable order hung in the balance were prices cut. Sheets are from $1 to $1.50 a ton lower in this market, through Eastern producers upsetting the agreement which was recently made by independent makers to maintain prices on the basis of 2.20c Pittsburg, for No. 27 gauge. Pig iron is without interest, and both Northern and Southern grades are lower. A lot of 500 tons of Southern No. 2 was sold in this city last week at $9 Birmingham, and reports are current that $13.50 Chicago has been shaded on Northern No. 2. Steel hoops are being hammered down by the active competition of leading makers, and 1.20c is said to have been made, though 1.35c represents about the average in the Chicago market. Plates are quiet and new business in heavy rails is also light. The most encouraging feature of the local situation, however, next to the active demand for iron and steel bars from the agricultural trade, is the improvement in the tonnage and volume of orders from railroad sources. One thousand tons of billets were bought during the week by a local company for working into axles, and about 1,200 tons of structural shapes were also specified for car construction. In addition, there were considerable purchases of angles, spikes, track bolts and nuts by Western and Southwestern roads, some covering for their entire requirements for the year. The demand for wrought iron for car work is also very brisk. The movement in structural steel is good and the outlook more promising. Buildings to be erected in this city are being figured on that will require 20,000 tons of steel, work on some of which will be commenced as soon as the weather moderates. With the opening of spring, a marked improvement is expected all along the line, but will be felt more particularly by the fabricators of steel for building work and the many foundries in this city making a specialty of architectural castings. Wrought and cast iron pipe are active, the sales of the latter including 1,400 tons to Grand Rapids, Mich., and 600 tons to the city of Toledo. Coke has felt the stimulus of cold weather and freight blockades at Eastern ovens, and prices are somewhat firmer. Scrap is easier as a result of the offerings by railroads and manufacturers, but it is expected the recent heavy snowfall will stiffen the market again.

Pig Iron.—Further recessions in prices mark the week's developments in pig iron. The abandonment of the $10 Birmingham basis has been accepted as a step that was inevitable. Southern No. 2 foundry is now freely offered at $9.50, and is weak at this figure. Lower prices are quoted, and an order for 500 tons of No. 2 was taken from a local foundry during the past week on the basis of $9 Birmingham. On the other hand, a fair sized tonnage has been closed at $9.50, including one lot of 2,400 tons. There is so little trading that it is difficult to tell what furnaces would do on a desirable order. Practically all the buying is in lots ranging down from 500 tons to carloads, with more inquiries for the latter than for the former tonnage. No improvement is expected until the weather moderates, and some sellers believe that in the interval furnaces will be again selling iron on the basis of $9 Birmingham. Northern irons have also suffered in the general weakness of the market, though they are enjoying a better demand than Southern grades. Local furnaces are asking $13.50 for No. 2, but a lower price than this has been made in this market by producing interests east of this city. The buying is limited to small lots, all for shipment within the next 30 days. We have revised our quotations as follows:

Lake Superior Charcoal	$15 50 to 16 00
Northern Coke Foundry No. 1	14 00 to 14 25
Northern Coke Foundry No. 2	13 50 to 13 75
Northern Coke Foundry No. 3	13 00 to 13 25
Northern Scotch Foundry No. 1	15 00 to 15 25
Ohio Strong Softeners No. 1	15 30 to 15 80
Ohio Strong Softeners No. 2	14 80 to 15 30
Southern Coke Foundry No. 1	13 85 to 14 10
Southern Coke Foundry No. 2	13 35 to 13 60
Southern Coke Foundry No. 3	12 85 to 13 10
Southern Coke Foundry No. 4	12 35 to 12 60
Southern Gray Forge	13 10 to 13 35
Southern Mottled	12 10 to 12 35
Southern Silveries (4% to 6% Silicon)	14 85 to 15 35
Jackson Co. silveries (8% to 10% Silicon)	18 30 to 18 80
Alabama and Georgia Car Wheel	19 85
Malleable Bessemer	14 00 to 14 50
Basic Iron	13 85

Iron and Steel Bars.—No diminution is noted in the heavy volume of buying of these products which has been in evidence during the past five weeks. While heretofore it has been confined largely to manufacturers of wagons and agricultural implements, railroads have placed some good orders for bar iron during the past week. Most of the buyers of iron stipulate quick shipment, while consumers of steel are generally purchasing for requirements up to July. Steel hoops are selling freely under the active competition and cutting of prices by mills. The general price in this market is 1.35c, though 1.20c has been done on special lots. Store trade in all products is good. We quote prices for Chicago delivery, mill shipments, carload lots, as follows: Bar iron, 1.40c to 1.45c, half extras; soft steel bars, 1.46½c, half extras, with 5c to 10c per 100 pounds extra for less than carload lots, with the regular extras for less than a ton of a size; angles, less than 3 x 3, 1.56½c base, full extras; hoops, 1.35c, full extras. On shipments from store, we quote iron bars, 1.60c to 1.70c base, full extras; steel, 1.60c to 1.75c, half extras; small angles, channels and tees, less than 3 x 3, 1.70c to 1.85c rates, half extras; hoops, 1.75c to 2c.

Billets.—Sales have been made in this market of about 2,000 tons of billets, half of which came from a local car company for working into axles. Prices are being maintained, and we quote both Bessemer and open-hearth billets, $24 Chicago; out of store, 1.30c.

Sheets.—The demand has not been heavy during the week just closed, attributed largely to the cold weather and to the fact that many consumers bought heavily some weeks ago when prices were readjusted. The recent agreement of independent makers has received a set-back in this market by the action of some Eastern mills shading prices $1 to $1.50 per ton. We quote No. 27 black, 2.36½c to 2.41½c; No. 28, 2.46½c to 2.51½c. Galvanized No. 27, 3.26½c to 3.31½c; No. 28, 3.36½c to 3.41½c. On small lots from store, we quote as follows: Nos. 8 and 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.30c to 2.35c; No. 16, 2.40c to 2.45c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.65c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.80c to 2.85c;

No. 29, 2.95c to 3c; No. 30, 3.10c to 3.25c. Galvanized, 75 and 7½ percent.

Structural Steel.—Aside from an order for 1,200 tons of structural shapes for car building work, there has been little new business during the week. The buildings reported heretofore are still in abeyance, and no new developments are expected until the cold weather is passed. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 1.90c; 18, 20 and 24-inch, 10c extra; tees, 1.95c rates.

Plates.—Both new business and specifications continue light. We quote prices on carload lots, mill shipments, Chicago delivery, as follows: Tank steel ¼ inch and heavier, 1.76½c; flange steel, 1.86½c. From warehouse, we quote small lots: Tank steel, ¼ inch and heavier, 1.90c to 2c; 3-16, 2c to 2.10c; No. 8, 2.10c to 2.20c; No. 10, 2.15c to 2.25c; flange steel, 2.25c, all f. o. b. warehouse.

Rails and Track Supplies.—The demand for track supplies during the past week has been very heavy, including large orders from several Western and Southwestern roads. Light rails are in fair demand, though prices are weak. Specifications for heavy rails are coming forward freely. No changes in prices are reported, and we quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality, rails, $27; 25-pound rails, $25 to $26; 12-pound rails, $26 to $28, with regular differentials for intermediate sizes. The following quotations on track supplies, which are f. o. b. Joliet mill, may be shaded on large orders: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.80c (out of store, 1.90c rates); track bolts 3½ x ¾, with square nuts, 2.40c to 2.50c per 100 pounds, with hexagon nuts, 2.55c to 2.65c, with usual differentials for other sizes.

Merchant Steel.—Business keeps up to past proportions, the orders from the implement trade being very encouraging. Prices are without change and we quote carload lots, mill shipments, Chicago delivery: Spring steel, 2c; sleigh shoe, flat sizes, 1.60c; concave and convex, 1.75c; cutter shoe, 2.25c to 2.30c; smooth finished machinery steel, 1.71½c base; plow steel, 2.30c and upwards, according to quality; toe calk, 2.01½c to 2.11½c. Ordinary grades of tool steel, 6c to 8c; specials, 12c and upwards. Cold rolled shafting, in carload lots, 52, and in less than carload lots, 47 percent discount from list.

Merchant Pipe.—Mills report a brisk demand for all sizes, and that practically their entire production goes into immediate consumption. We quote, carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe. Black. Per cent.	Galv. Per cent.	Guar. Wrought Iron. Black. Per cent.	Galv. Per cent.
⅛ to ¾ inch	67.35	57.35	64.35	54.35
½ inch	70.35	60.35	67.35	57.35
¾ to 6 inches	74.35	64.35	71.35	61.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—A fair business is reported by jobbers, many consumers having placed their spring orders in the past week. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows:

	L. W. Steel. Percent.	C. C. Iron Percent.	Seamless Steel. Percent.
1 to 1½ inch	42.35	39.85	53.35
1¼ to 2¼ inch	54.35	37.35	40.35
2½ inch	57.35	45.35	....
2¾ to 5 inch	63.35	49.85	Up to 4 inches.
6 to 13 inch	54.85	37.35	48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron Percent.	Seamless Steel. Percent.
1 to 1½ inch	40	35	37.50
1¼ to 2½ inch	50	32.50	35
2¾ to 5 inch	60	45	Up to 4 inches.
6 to 13 inch	50	32.50	45

Cast Iron Pipe.—Two municipal contracts placed during the week were for 1,400 tons for Grand Rapids, Mich., and 600 tons for Toledo, O. Other business aggregates a respectable tonnage. We quote, carload lots, Chicago delivery: 4-inch water pipe, $26.50; 6-inch to 12-inch, $25.50; larger sizes, $24.50; gas pipe, $1 a ton higher. These prices may be shaded on larger orders.

Wire Products.—The demand continues of heavy proportions and includes all products. Reports have been current that the leading interest contemplated putting up its prices, and while these have been denied by officials of that company, their currency has stimulated the demand. Prices are without change, and we quote to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.05; less than carload lots, $2.10; cut nails, carload lots, $1.86½c; less than this amount, 1.91½c; plain wire, $1.95 carloads, and $2 for less than carload lots; galvanized plain wire, $2.25 in carload lots, and $2.30 in lesser amounts; painted barb wire, $2.35 carload, and $2.40 less than carload lots; galvanized barb wire, $2.65 carloads, and $2.70 less than carload lots. Staples, polished, carloads, $2.20; less than carload lots, $2.25; galvanized, $2.50 carloads, and $2.55 less than carloads. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—The scarcity of cars in the East and freight blockades at ovens, has strengthened the local market. Little fuel is on track here and prices have stiffened. Connellsville 72-foundry coke, however, is still quoted from 1.90c to 2.25c at the ovens, or $4.55 to $4.90 Chicago, and it is not doubted that a better price could be obtained on a desirable order.

Old Material.—The full offerings by railroads and manufacturers during the past week have given some ease to the local market and have necessitated the lowering of prices on several products. The demand from mills and foundries continues quiet, though it is reported that several of the former are operating on close margins and will have to enter the market shortly. The continued cold weather and heavy snowfall will undoubtedly stiffen prices and create a more active demand, and the recessions of the past week are expected to be regained. We quote dealers' selling prices, gross tons, as follows:

Old iron rails	$16 00 to 17 00
Old steel rails (mixed lengths)	10 00 to 11 00
Old steel rails (long lengths)	12 00 to 12 50
Relaying rails	23 00 to 24 00
Old wheels	13 00 to 13 50
Heavy melting steel	10 00 to 10 50
Mixed country steel	7 50 to 8 00

The following are selling prices for net tons:

No. 1 R. R. Wrought	$12 00 to 12 50
No. 2 R. R. Wrought	11 00 to 11 50
Shafting	12 50 to 13 00
Dealers' forge No. 1	9 50 to 10 00
No. 1 busheling and wrought pipe	9 00 to 9 50
No. 1 cast	11 50 to 12 00
Heavy cast (300 pounds and over)	8 50 to 9 00
Agricultural malleable	8 25 to 9 00
Iron axles	15 50 to 16 00
Steel axles	13 00 to 13 50
No. 1 boilers, cut	8 00 to 8 50
Cast borings	4 00 to 4 50
Mixed borings, etc.	4 00 to 4 50
Wrought turnings	7 00 to 7 50
Machine shop turnings	7 00 to 7 50
Iron axle turnings	8 00 to 8 50
Steel axle turnings	7 00 to 7 50
Stove plate and light cast scrap	9 00 to 9 50
Old iron splice bars	13 00 to 13 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, Feb. 23.

As war sometimes begins without a formal declaration, it is possible that ore may soon be sold before an official decision is reached on the question whether there will be an ore association; but such action is not expected. One excellent reason is that it is almost impossible to find a buyer who is willing to place an order. Now and then a letter is received from a furnaceman, asking what is being done by the ore producers, but no interest indicative of a desire to buy is manifested. There have been no further meetings of ore producers and selling agents, but one has been called for next Monday.

Pig Iron.—A meeting of the Bessemer Pig Iron Association was held in Cleveland Feb. 20, at which there was a general discussion of present conditions which, with Bessemer selling very slowly in the Valley at $12.50 to $12.75, were conceded to be unsatisfactory. The possibility of the United States Steel Corporation coming into the

market for iron, as recently reported, was referred to, but even the most optimistic found little ground for hoping that such an order would be placed. There are indications that in Ohio the corporation is now using the full output of its stacks and that the time may soon come when, rather than ship pig iron from its Pennsylvania furnaces, it might find it economical at present prices to purchase from stacks located near its Ohio steel plants. The usual quotation for No. 2 foundry at Valley furnace is $12, but some companies which recently sold at low prices are content not to press vigorously for orders for a time and are holding at $12.50. One order for 500 tons for quick shipment of iron which has the reputation of commanding a little higher than the market price, was placed at $12.25, Valley. The buyer offered to take 500 additional tons, provided the prices were reduced to $12.15, but this proposition was not accepted. The Southern producers are again showing anxiety to obtain business and $9.25, Birmingham, for No. 2, or $13.10, Cleveland, is now openly offered on certain brands while others are still held at $9.50, the price we quoted last week. We quote as follows for Cleveland delivery, save on Northern gray forge, which is at Valley furnace:

Bessemer	$13 35 to 13 60
No. 1 Strong Foundry	13 15 to 13 40
No. 2 Strong Foundry	12 75 to 12 85
No. 3 Foundry	11 90 to 12 25
No. 2 Southern	13 10 to 13 35
Gray Forge, Valley furnace	11 50 to 12 00
Gray Forge, Southern	11 75 to 12 00
Lake Superior charcoal	16 00 to 16 50

Finished Material.—The continuation of the keen competition in hoops is the most interesting feature of the market in finished material. One company has offered to sell at 1.30c, but is apparently not anxious to take much business at that price and sales have been made by the principal producer at 1.40c. Business in steel bars at 1.30c for Bessemer and 1.40c for open-hearth continues to be satisfactory. Bar iron is dull at 1.30c to 1.35c, the prices of the principal producers, and the smaller concerns are not so strongly in evidence. Several mills have recently been closed because at prevailing prices for scrap they could not make any money on bar iron. A few orders of fair size for structural material have been placed. The use of concrete as a substitute for steel is receiving more attention from sellers of structural steel, who are giving prominence to articles recently published by eminent engineers to show the advantages of steel. In spite of recent attempts to maintain prices of sheets, cutting is still heard of. Prices of the principal producer through jobbers are as follows: Mill sales of black sheets, No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.20c; No. 28, 2.30c. Galvanized, 80, and 5 off. Out of stock prices are as follows: No. 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.10c. Galvanized out of stock, No. 16, 75, 10 and 7½ off; No. 18-20, 75 and 10 and 7½ off; No. 22-28, 75, 10 and 7½ off.

Old Material.—The market is firm and prices are tending upward. The demand for stove plate is strong and it has advanced in price 50 cents to $1. Heavy steel advanced to $13.50 to $14 the latter part of last week, but has declined to our quotation of last week, $12 to $13. Mill men complain that prices of scrap which they use are abnormally high. We quote as follows for gross tons, Cleveland:

Old iron rails	$16 00 to 17 00
Old steel rails (over 6 feet)	13 50 to 14 50
Old steel rails (6 feet and under)	13 00 to 14 00
Old car wheels	13 00 to 14 00
Steel boiler plates	9 00 to 10 00
Malleable iron (railroad)	11 00 to 12 00
Malleable iron (agricultural)	9 00 to 10 00
Heavy steel	12 00 to 13 00

We quote the following net tons:

No. 1 R. R. wrought	$12 00 to 12 00
No. 1 busheling	11 00 to 12 00
No. 1 machine cast scrap	12 00 to 13 00
Iron axles	16 50 to 17 50
Axle turnings	9 00 to 10 00.
Wrought turnings (free from cast)	7 50 to 8 25
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	8 00 to 9 00
Pipes and flues (clean)	10 00 to 11 00
Tank iron	9 00 to 10 00
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00
Wrought drillings	7 00 to 8 00
Stove plate	9 50 to 10 50
Steel axles	13 00 to 14 00
Cast borings	4 50 to 5 50

CINCINNATI.

Feb. 23.

The coke market is unchanged in tone and volume of sales. Prices remain stationary and quotations are still $2 to $2.25 f. o. b. ovens for Connellsville coke.

Pig Iron.—The most notable transaction in the week was some buying in Richmond, Ind., of both Northern and Southern iron. It is reported to have included 300 tons of Southern No. 3 foundry at $8.50, Birmingham, and some Northern No. 2 foundry, about 200 tons, at $13.20 delivered. The sales of Northern iron netted a shade under $12 furnace for No. 2 and the Southern iron was on the basis of $9, Birmingham, for No. 2. It is reported in the trade that $9, Birmingham, for No. 2 foundry is being quoted on competitive business but still a few of the favorite brands are being sold in moderate quantities at $9.25 and $9.50 for No. 2 Birmingham. There is some inquiry for second quarter delivery but the bulk of the business is for early shipment and small quantities. A sale of 7,500 tons of basic is reported at $10, Birmingham, for early delivery. Ohio furnaces are endeavoring to maintain $ 2.25 and $12.50 furnace for No. 2 foundry but under competition are taking desirable business at $12 and a shade under for No. 2 foundry. The feeling in the market is decidedly easy and the varying freight rates from Ohio furnaces, as well as the different views of Southern furnaces, make quotations irregular. Current prices f. o. b. Cincinnati, are:

Southern Foundry No. 1	$12 25 to 12 75
Southern Foundry No. 2	11 75 to 12 25
Southern Foundry No. 3	11 25 to 11 75
Southern Foundry No. 4	10 75 to 11 25
Southern Foundry No. 1 soft	12 25 to 12 75
Southern Foundry No. 2 soft	11 75 to 12 25
Gray forge	10 75 to 11 00
Northern Foundry No. 1	13 90 to 14 15
Northern Foundry No. 2	13 40 to 13 65
Northern Silvery (8% silicon)	16 15 to 16 65
Southern car wheel iron	17 50 to 18 00

Finished Material.—There has been no change in the market for finished material in the past week. Trade has been quiet, with nothing in the way of developments that would influence prices in a general way, but the quotations on black sheets from store are lower on most sizes. Bar iron is quoted at 1.35c to 1.40c f. o. b. Steel bars continue to be quoted at 1.43c base, half extras, with the retail price 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 and 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.80c; No. 27, 2.70c; No. 16, 2.45c; No. 14, 2.35c; No. 12, 2.30c; No. 10, 2.25c. Tank plates are easy and sell out of store at 2c for ¼-inch and 2.10c for 3-16-inch. Beams and channels are quoted at 1.90c to 2c from stock and angles at 1.90c to 2c for base sizes.

In merchant pipe the trade has been about normal for this season of the year and considering all the features of the situation. Independent mills are still quoting under the schedule of the leading interest on some sizes but this is not being done to an extent which disturbs the market. Car lots are quoted as follows:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	67.7	57.7	64.7	54.7
½ inch	70.7	60.7	67.7	57.7
¾ to 6 inch, inclusive	74.7	64.7	71.7	61.7
7 to 12-inch inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	27.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 3 inch	63.2	49.2
3½ to 13 inch	54.2	36.7

Old Material.—There has been noted a steady improvement in the demand from melters but there is no strength in the market and prices are irregular. Prices to consumers are as follows:

Old No. 1 railroad wrought, net tons	$11 50 to 12 00
Cast machine and foundry, net tons	11 00 to 11 50
Old iron rails, gross tons	16 00 to 16 50
Old steel rails, gross tons	13 00 to 14 00
Old short lengths, gross tons	11 00 to 12 00
Old iron axles, net tons	15 50 to 16 50
Stove plate, net tons	9 50 to 10 50
Wrought turnings, net tons	7 50 to 8 00
Cast borings, net tons	4 00 to 5 00

PHILADELPHIA.

Feb. 23.

General conditions have not improved and, while there is fair business in finished lines, the marked weakness of pig iron continues. There is some demand for railway supplies, but the tonnage ordered is probably not one-third of that of a year ago. In the cast iron pipe trade prospects are excellent.

Pig Iron.—Southern irons are much weaker, but prices on Northern brands show little change. Buyers are placing orders in very small quantities and the outlook is not encouraging. We quote as follows, although orders of fair size for early delivery could probably be placed at somewhat lower figures: No. 1 X Foundry, $15.50 to $16.00; No. 2 X Foundry, $14.50 to $15.00; No. 2 Plain, $14.00 to $14.25; Southern No. 2, rail shipment, $13.50 to $13.75; Southern No. 2, on dock, $13.00 to $13.25; Standard gray forge, $13.50 to $14.00; ordinary gray forge, $12.75 to $13.00; basic, $13.75 to $13.85.

Steel.—The demand is well maintained and many mills have enough orders to insure their regular operation for some time. The buying is not in large lots, but orders of fair size are numerous.

Finished Material.—Steel bars are in good demand and plate and sheet mills have more orders. The severe weather has interfered with the operations of some plants. We quote, delivered prices: Best refined bar iron, $1.35 to $1.40; tank plates, steel, $1.73½; angles, $1.50 to $1.60; beams, channels for 15-inch and over, $1.73½.

Old Material.—Prices are firm, but sales are not numerous. We quote: Old steel rails, $13 to $13.50; miscellaneous heavy steel, $12.75 to $13.25; old steel axles, $16 to $16.50; old iron axles, $18 to $19; old iron rails, $15 to $15.50; old car wheels, $13 to $13.50; choice railroad No. 1 wrought, $16 to $17; country scrap, $15 to $16; machinery cast, $13 to $13.50; No. 2 light scrap, forge, $10.50 to $11; No. 2 light scrap, ordinary, $8.50 to $9; axle turnings, $10 to $10.50; wrought turnings, $9.25 to $9.50; cast borings, $7 to $7.25; stove plate, $11 to $11.50; wrought iron pipe, $12 to $12.50; boiler punchings, 15.50 to $16.50.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., Feb. 23.

Pig Iron.—The dullness which has prevailed in the local pig iron market for several weeks did not abate any during the week under review. Current orders are confined to small lots and are all for immediate shipment. Not in some time have buyers been so insistent in this respect as recently. Prices showed come recession during the week, especially in Southern brands. The Southern furnaces are finding it difficult to compete in Northern markets, and wherever they do book an order it is at the expense of prices. One large company is still holding $9.50, Birmingham, for No. 2, but it is losing business in consequence. The market is $9.25 for small lots, but large quantities easily command concessions. It is authoritatively stated that a leading pump company which was in the market for 600 tons, placed the order with a Southern furnace for less than $9, Birmingham, for No. 2 foundry. In Northern irons, the undertone is weak, with only a fair tonnage being placed. Buying for forward delivery seems to have gone out of vogue. Sales agents for Southern interests find that notwithstanding their willingness to close contracts for six months' delivery at present prices, buyers show no disposition whatever to take hold. On the other hand buyers recognize that makers have not much confidence in the future when they are willing to do as stated. At any rate, buying is only to meet immediate requirements, and there is every reason to believe that this will prevail for sometime to come. New York prices are as follows: Northern No. 1X, $15 to $15.75; No. 2X, $14.75 to $15.25; No. 2 plain, $14.25 to $14.75; No. 1 Southern foundry, $13.25 to $13.75; No. 2 foundry, $12.75 to $13.25; No. 3 foundry, $12.25 to $12.75; No. 4 foundry, $11.75 to $12.25.

Rails.—No contracts were placed during the week, but there are several large propositions pending, which are liable to be closed at any time. The mills are talking in a more confident strain concerning the outlook. Standard sections are $28 at mill.

Billets.—There is very little doing here, but the export trade is brisk. Since December foreign shipments have footed up to about 30,000 tons, of which 2,500 tons went out in the past week.

Finished Iron and Steel.—In structural shapes, no new contracts of any note have been taken. A Western road is out with an inquiry for 6,000 tons, and propositions in sight in the building line, which have not yet passed their initial stage, aggregate about 20,000 tons. No definite news is available regarding the probable tonnage that Baltimore will take. Initial contracts amounting to about 1,500 tons are reported. In plates there is a little more activity, with some good orders in prospect from ferry-boat construction. Sheets are quiet, with prices not as strong as they have been. A better feeling prevails in bars, and orders show an increased tonnage. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron bars, 1.40c to 1.45c; soft steel bars, 1.40c to 1.50c; steel sheets, in carloads, New York, No. 28 black, 2.45c to 2.50c; galvanized, 3.50c to 3.55c.

The Metal Market.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK Feb. 23.

Demand for metals is of a quiet nature, and with the exception of pig lead, prices are without change. This material has advanced 2½c per 100 lb. Copper is unchanged, and we quote Lake, 13⅜c to 13¼c for carload lots, and 13¾c to 14c for lesser lots; casting, carloads, 12½c to 12¾c; less than carload lots, 12¾c to 13c. Pig lead, 4.45c in carload lots, and 4.50c to 4.55c in lesser quantities. Pig tin is unchanged, car lots being quoted 30c; and lesser quantities, 30½c. Spelter, 5c carloads, and 5⅜c to 6c for lesser amounts. Sheet zinc, 5.65c per pound for 600-pound casks, with 20c advance for less than carload lots. Antimony is firmer and prices have advanced; Cookson's being quoted 9c, and Hallett's 7½c. Nickel is 45c to 60c according to amount and deliveries.

Old metals are quiet and prices have a sagging tendency. We quote copper wire and heavy, 11c; copper bottoms, 10c; red brass, 10½c; yellow brass (heavy), 7.50c; yellow brass borings, 6.25c; red brass borings, 8c; light brass, 5½c; pipe lead, 4c; zinc, 3¼c.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., Feb. 23.

Pig Tin.—Interest in the market during the week was chiefly centered in spot tin, which on account of its scarcity was very strong, but declined later on when heavy shipments began to arrive. These will continue heavy for several weeks. The general trade situation is said to be a little better. The London market during the week was firm in the earlier part, but latest cables show quite a recession from the highest. Closing prices at the Metal Exchange today were as follows: Spot, 28¼ to 28¾c; February, 28 to 28½c. London's closings today follow: Spot, £125 15s; futures, £125 10s. Arrivals at Atlantic ports for the month to date amounted to 2,416 tons, with 4,008 tons afloat.

Copper.—The recent improvement noted in the market seems to have spent its force, for dullness was more in evidence during the past week than for several weeks prior.

Wall Street interests, which has been very active in booming the metal recently, seem to have abandoned their task for the time being, and are permitting it to take its own course. In trade circles cheerful reports are not plentiful. During the week the London market was fairly active, with prices showing a tendency to sag. Closing prices at the Metal Exchange today follow: Lake, 12½ to 12¾c; electrolytic and casting, 12⅜ to 12⅝c. London's closings today follow: Spot, £57 2s 6d; futures, £56 7s 6d. Exports for the month to date aggregate 8,759 tons, against 4,711 tons for a corresponding period last year.

Lead.—Is firmer, with spot at 4.50 to 4.60c. St. Louis is strong at 4.40c, and London quiet at £11 13s 9d.

Spelter.—Is stronger and active at 5.00 to 5.10c. St. Louis advanced to 4.82½c, London is higher at £21 12s 6d.

Antimony.—War conditions still operate to make prices strong. Cookson's is 7¾ to 8c; Hallett's, 7 to 7¼c, and other brands, 6¼ to 6¾c.

Quicksilver.—We quote $46 per flask of 76½ pounds in lots of 100 flasks. London is £8 5s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c and 60c for smaller quantities

Obituary.

W. F. Logan, manager of the Illinois Bridge & Iron Co., died at his home in Sullivan, Ill., Feb. 14.

Alex. Kilpatrick, a pioneer foundryman of St. Louis, died on Feb. 9. He came to St. Louis in 1839, and in 1861 built the gun boats Lafayette and Choctaw, which were used on the Mississippi during the Civil War. His firm was originally known as Kilpatrick & Marshall, but after Mr. Marshall's death he included his three sons in the business under the name of Kilpatrick & Sons. Until Jan. 1 Mr. Kilpatrick himself was president of the company, but at that time he was succeeded by his eldest son.

Geo. R. Ellis, Indianapolis, Ind., died at his home in Indianapolis on Feb. 12. Mr. Ellis was born on a farm near Georgetown, Brown County, O., in 1844. He enlisted in the Civil War and saw hard service in many battles. After the war he engaged in the foundry business in Indianapolis, being a member of the firm owning the Enterprise Foundry & Fence Co.

G. Bruce Harton, one of the directors of the Crucible Steel Co. of America, and a retired steel manufacturer of Pittsburg, died at Atlantic City on Friday, Feb. 19, of apoplexy, after a few days' illness. Deceased was one of the best known men in the steel business in Pittsburg, having been connected with the Singer-Nimick Co. for almost a lifetime, and when it was absorbed by the Crucible Steel Co. of America he was its vice president. After the plant's absorption he was appointed its manager but retired after serving a short time, and was elected a director of the Crucible Steel Co. He was born in Pittsburg in November, 1848.

L. M. Ormsby, one of the pioneer furnacemen of the Shenango valley, died Feb. 16 at his winter home in Fremont, Neb., after a short illness of pneumonia. Mr. Ormsby was born near Sharpsville, in 1837. For many years he operated coal mines in that locality, and in 1872, in company with his father and brother, E. W. Ormsby, erected the Mabel furnace at Sharpsville. Later, removing to Mercer, he engaged extensively in coal mining at Jackson Center. He went West in 1890 and purchased a sheep ranch at Casper City, Wyo., which is now one of the most extensive in the country.

The Scott Patent Brick Car Co., of Knoxville, Tenn., has purchased the property of the Car Wheel Co. in that city and will spend $200,000 in improvements. The company will manufacture all kinds of steel cars for brick yards, coal mines, etc. A large woodworking department will be installed for the manufacture of wheelbarrows of all descriptions—of wood and iron—and of clay and mining cars, trucks, etc. A. A. Scott, Alex. A. McMillan and W. J. Oliver are the directors of the company.

C. H. McCutcheon, manufacturer of sheet iron, copper and brass and engine and marine supplies, Buffalo, N. Y., is erecting a new building on Indiana street, that city, to be devoted to the sheet metals and steamfitting departments of his business.

PERSONAL.

W. E. Corey, president of the United States Steel Corporation, returned to New York on Saturday, Feb. 20, on the Cedric, which sailed from Liverpool on Feb. 12.

D. B. McClelland, formerly of the Crane Co., Chicago, has been appointed general sales agent of Spang, Chalfant & Co., Inc., of Pittsburg. Mr. McClelland was connected with the sales department of the American Tube & Iron Co. for a number of years.

John M. Jones, formerly superintendent of the Humbert plant of the American Sheet & Tin Plate Co., Connellsville, Pa., has been appointed superintendent of the company's Demmler plant at McKeesport, Pa., to succeed George Crawford.

O. W. Kennedy, late superintendent of the H. C. Frick Coke Co., with headquarters at Uniontown, Pa., has been appointed general manager of the Orient Coke Co., with headquarters at Uniontown, Pa.

Charles M. Schwab sailed Feb. 11 from New York for Europe, on the steamer Lorraine. It was stated at his office that it had been Mr. Schwab's intention for many weeks to go to Europe for his health, under the advice of his physician.

L. J. Myers has been elected a director of the Oneida Steel Pulley Co., Oneida, N. Y., in place of C. H. Bicalky, resigned.

Wm. I. Buchanan, who recently returned from a trip to Panama on a special mission for the United States Government, has been appointed deputy chairman and managing director of the British Westinghouse Electric & Mfg. Co., Ltd.

B. F. Harper, who recently accepted a position with the Carnegie Steel Co. as special sales agent, will make his headquarters at the home office, Pittsburg.

George W. Smith, a well-known railroad man, who has been with the Lehigh Valley a number of years, has accepted the position of Buffalo representative of George F. McKay, traffic manager of the Lackawanna Steel Co., whose office is at 100 Broadway, New York.

John P. Shaddick, who recently resigned his position with the Carnegie Steel Co. at Homestead, is now with the Lackawanna Steel Co.

Archibald Head, of the well-known London engineering firm, read a paper on "Metallurgy as Applied to Engineering" before the students of the Institution of Civil Engineers, London, on Jan. 29. The address contained many allusions to current practice in iron and steel manufacture, including references to notable achievement in the United States.

Rufus C. Crawford, auditor of the National Tube Works Co. at McKeesport, Pa., has resigned. His successor will be S. H. Fox. Mr. Crawford is the oldest clerical employe of the National Tube Works. He entered the office under the late Horace G. Crosby and E. C. Converse.

David Hunt Jr., formerly with Manning, Maxwell & Moore, and recently treasurer of the Baush Machine Tool Co., Springfield, Mass., has accepted the position of general sales manager for the Warner & Swasey Co., and will remove to Cleveland about March 15.

Herbert W. Cole, who established and made successful the Star Drilling Machine Co., of Akron, O., has organized the Crown Drilling Machine Co., of Akron, for the manufacture of the Crown well drilling machine.

William J. Rodgers, for the past 16 years vice president of the Enterprise Boiler Works, Youngstown, O., has resigned to become manager of the Girard Boiler & Mfg. Co., Girard, O.

John Fritz, of Bethlehem, Pa., a Bessemer medalist and an honorary member of the Iron and Steel Institute, is president of the American reception committee for the New York meeting of the institute in October of this year. An executive committee has been organized, of which Mr. Fritz is ex-officio president, C. Kirchoff chairman, Robert E. Jennings treasurer, and Theodore Dwight secretary.

The committee of the unsecured creditors of the Stillwell-Bierce & Smith-Vaile Co. appointed a meeting in Dayton, O., for Feb. 24 to devise ways and means for protecting the unsecured creditors and deciding on the election of a trustee. The chairman of this committee is A. B. Scully, of the Scully Iron & Steel Co., Chicago.

THE IRON TRADE REVIEW

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A. I. FINDLEY, - - - - - - - - EDITOR.
ROBERT I. CLEGG, - - EDITOR MACHINERY DEPARTMENT.
GEORGE SMART, - - - - - ASSOCIATE EDITOR.

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IMPORTANT DEVELOPMENTS IN TIN PLATE.

The position in the tin plate industry has grown still more interesting in the past fortnight. On Jan. 14 we referred to the heavy production and accumulation of stocks by the leading interest, presumably in anticipation of a prolonged shut-down in the summer for the purpose of readjusting wages. This view of the leading interest's intentions is so thoroughly accepted that in pig tin circles it is considered that the market has fully discounted the effect. In a normal year pig tin would be approaching a season of steadily increasing consumption, while this year the exact opposite is indicated. The pig tin market always discounts all the influences it knows of, and has thoroughly investigated this particular point in the past six weeks.

Following the formulation and execution of the leading producer's plan in the matter of tin plate wages, the independent manufacturers have taken up the subject on their own account. Reports are erroneous, however, that the independents will do anything in concert. They have never before acted in harmony on any question, and will not now. One independent company has closed its mill and states it will not be run until after the expiration of the present scale, unless the men should offer a substantial reduction from the scale, and that after this scale year the mill will be non-union. Another independent started operations on Monday, after a considerable period of idleness, on a special plan, which amounts in substance to the men putting up 25 percent of their wages as a guarantee that the company shall make repairs, maintenance and depreciation, and 5 percent on its investment. A third independent company has adopted the policy of paying no attention to the selling price of tin plate as promulgated by the leading interest, is quoting a higher price, and is indifferent to the booking of orders now, feeling that there will be plenty of business later on in odd sizes and special grades, when many mills now operating are shut down. Still another independent mill is non-union, and having made a reduction of 28 percent in wages, is conducting business in the ordinary way.

In all these cases there is at least a covert expression of the idea that there is no money in making tin plate at the present selling price, paying the current market for steel and pig tin, and Amalgamated Association wages. While the flat statement may be open to some question, there is no doubt that the profit is very small.

The indications that tin plate wages should come down are quite plain. All through the iron and steel industry there have been wage reductions, and, with the exception of tin plate, even the Amalgamated Association scales, which are signed to June 30 next, have not escaped. Through the operation of the sliding feature in the iron scale puddlers' wages have declined since July and August of last year from $6.25 to $5.25, or 16 percent, while in sheets a special convention last December reduced the base of the scale, an action unprecedented in the annals of the association .The present tin plate scale is the highest ever paid, since the establishment of tin plate making on American soil. The tonnage men, on 30 gauge, receive $12.37 per ton; under the scale in force until the reduced tariff of the Wilson-Gorman law caused or was made the excuse of a reduction, the corresponding wages were about $11.35 per ton, while the reduced wages amounted to $9.84, a reduction of 13.3 percent. The present wages are 9.0 percent above the early wages paid, and 25.7 percent above the lowest paid. This is not all. Only with difficulty could the men make up to the scale limit in the early days, when it was 5,250 pounds per turn on 30 gauge. Now the limit is 6,250 pounds, and there is no difficulty except that experienced by the officials of the association in trying to held the men down to it. Of course, helpers are more generally employed now and paid by the men out of their tonnage rates, but they still have some advantage from the increased make, in addition to the increased pay per ton. It is with tin plate making as with every other craft; in the early days when there is more or less mystery and the number of skilled men is limited, abnormally high wages are paid. Later on, the wages decline to a level proportionate to other crafts. Apparent exceptions to this rule are invariably removed in the lapse of time.

Between the cost of making a box of tin plate in the United States and in South Wales there is very little difference outside the cost of labor and the cost of steel. Tin is about the same price in both countries at all times, and the cost of everything outside of tin, steel and labor is so small that there could not in any case be a great difference. In some items American practice has a slight advantage; in other but even less important items the Welsh manufacturer has the advantage. Full weight coke tin plates have lately sold f. o. b. Welsh ports at 11s 3d per box, or $2.74, which, less the customary discounts of 3 and 1 percent is $2.63, or just 97 cents below the open American price, f. o. b. Pittsburg district mill for 108-pound cokes. This is a difference only slightly less than the total labor cost in American mills, paying the Amalgamated scale at the hot mills, the "tinhouse" scale in the departments covered by it, and the customary rates

of wages in departments wholly without organization. The spread between the actual difference in labor cost in the two countries and the difference of 97 cents in selling price is roughly comparable to the difference in cost of steel, which amounts to from 25 to 35 cents a box, taking concerns in each country which buy their steel in the open market.

The open market price on sheet bars, delivered to Pittsburg district mills, is $24 per ton. The Welsh makers have the advantage of rather sharp international competition in buying their bars. According to advices received this week, they are offering German bars at 73s Antwerp or 76s 6d delivered, or American bars at 74s delivered, the latter price being equal to $18 at par of exchange. There is, however, a disinclination on the part of the American steel interests to do business at this figure unless on large tonnages, while the Germans appear to be on the verge of marking up their prices a trifle.

For several years there has been a disposition to expect the disruption of the Amalgamated Association. Those who have expected its dissolution are inclined to look upon present day developments as clear signs of this event. It is possible they may be mistaken. It is true the association is in danger, but a new thing is true—that there is danger to manufacturers from its very weakness. When the association was strong, it at least performed one valuable service to the trade: it assured actual uniform wages at all plants in a given trade, operating under substantially similar conditions. There is danger now that the association may be kept alive to foster differences in conditions which may in the long run work decided hardships to certain interests. Some at least of the independent tin plate manufacturers are fully alive to this fact.

EXPANSION IN IRON ORE PRODUCTION.

The official statistics of iron ore production in the United States in 1902, just issued in the past week, show that in that year the high point was reached with a total of 35,554,135 gross tons. This was more than twice the production of 17,518,046 tons reported for 1897—a marvelous record of increase in the five years. It need not be expected, however, that the statistics for 1903 will show so great a total, and it is very certain that a considerable falling off will be shown when the official figures are collected for 1904. Though pig iron production in 1903 was greater by 187,945 tons than in 1902—18,009,252 gross tons, as against 17,821,307 tons—a smaller ore production was needed in 1903 in view of the excessive working of important properties in the preceding year. The United States Steel Corporation, in carrying out its policy of maintaining a large reserve at Lower Lake docks and at its furnaces, increased its production in 1902 more than 25 percent beyond its needs. This in part accounts for the fact that Lake Superior ore shipments in 1903 were 3,289,526 tons less than in 1902—24,281,121 tons, against 27,571,121 tons—even though the country produced nearly 200,000 tons more pig iron in the former year. Merchant ore companies in the Lake Superior region shipped more ore than was sold, and furnace companies took into their yards in that year considerably more than their requirements for the 12 months expiring with the opening of navigation in 1904. The effect of this unprecedented accumulation of ore will be shown in a great shrinkage of the ore figures for 1904.

In doubling its iron ore production in five years the United States has made a record without a parallel in foreign countries, or in its own history, remarkable as that has been. The commonly accepted measure of increase in pig iron production—a doubling, or substantially that, every 10 years—is cut in twain by the showing of the iron ore statistics. An inspection of the figures for iron ore production in 1897 and the five years following, which in millions are 17, 19, 24, 27, 28 and 35 respectively, would naturally prompt enthusiastic prophecy of an onward movement. Yet all records for a considerable period of years are to the contrary. Advances are followed by backward steps. But it is noteworthy that after each period of retrogression a new high mark is reached before any break comes in the ascending scale. The following statement of iron ore production in the United States in 1880 and in 1889 and the years following is of interest:

1880	7,120,362	1896	16,005,449
1889	14,518,041	1897	17,518,046
1890	16,036,043	1898	19,433,716
1891	14,591,178	1899	24,683,173
1892	16,296,666	1900	27,553,161
1893	11,587,629	1901	28,887,479
1894	11,879,679	1902	35,554,135
1895	15,957,614		

Bessemer Converter at Ensley, Ala.

Reference has been made in these columns to the experiments made last year at the Ensley, Ala., basic open-hearth steel plant of the Tennessee Coal, Iron & Railroad Co., in which hot metal from the blast furnaces was first blown in a small Bessemer converter before being introduced into the open-hearth furnace. The company recently completed the installation of a large converter, which is now in operation. The hot metal from the furnaces is taken directly to the converter and after the customary blowing process, in which considerable silicon is burned out, is poured into the open-hearth furnaces. Owing to the preliminary blow it is expected that the metal will take only about half the time in the open-hearth furnace that used to be necessary for it to come to steel of the desired analysis. Thus the open-hearth furnaces will have their output very largely increased. It is too early at this writing to say much about the practical results of the departure as the tests have not yet been on a large enough scale to make sure, but the preliminary reports are highly satisfactory.

President Joseph E. Schwab, of the American Steel Foundries, announces that the Chicago plant at 711 69th street will be removed to Indiana Harbor May 1. Mr. Schwab said: "We have 30 acres at the new site and good railway facilities. The plant now employes between 700 and 800 men, but with our new equipment we will be able to give work to about 1,500. Next to the plant in St. Louis, the new one will be the largest in the country. It is our aim to get everything under one roof as nearly as possible, so as to concentrate the work."

There has been a further reduction of 65 employes of the Jeffersonville, Ind., plant of the American Car & Foundry Co. The freight department has been closed since Jan. 1 and on Feb. 15 the blacksmith shop was locked. The office force has been reduced one-half.

The Western Electric Co. will install in Philadelphia, two direct connected units, one of 100 and the other of 150 h. p., to be furnished by the Ball Engine Co., Erie, Pa.

The Labor Situation.

COMMISSIONER DU BRUL ON THE ANTI-INJUNCTION BILL.

(Special Correspondence.)

WASHINGTON, Feb. 23.—At a meeting of the Committee on Labor of the House of Representatives on Thursday, Feb. 18, E. F. Du Brul, commissioner of the National Metal Trades Association, made an able and exhaustive argument against the passage of the bill enforcing the eight-hour day on all Government contracts. Almost the full membership of the committee was present at the hearing and the interest aroused on the part of the members of Congress was well evidenced by the number of questions put to the speaker.

In opening Mr. Du Brul told the committee that they would at this session have far more protests against the eight-hour measure than had been presented at any previous session. "For," said he, "more people are thinking and worrying about this thing than did four or even two years ago." He emphasized the impossibility of running part of a plant on the 8-hour plan and the remainder on the 9-hour or 10-hour system. Said he in this connection: "Any such attempt would inevitably cause dissatisfaction and lead to strikes and all the attendant troubles. This is admitted by advocates of the bill. Messrs. Gompers and O'Connell both admitted that such a contingency was to be anticipated."

The speaker ventured the prediction that in a majority of cases manufacturers in the metal trades and kindred industries would refuse to take Government work in the event of the passage of the bill. In answer to a question as to what relation Government work bore to the entire output of manufacturing plants in the metal trades, he said: "Government work is, I believe, in the minority in every large manufacturing institution. It constitutes only from 2 to 30 percent in many shops which handle very large quantities of Government work. Obviously, a manufacturer placed in such a position cannot afford to sacrifice all his business for so small a proportion, or if he does not give up the Government work he will be obliged to confine himself to it."

In explaining the detrimental results which would follow the adoption of an eight-hour day, Mr. Du Brul referred to the part which standardization now plays in the conduct of the modern manufacturing plant; pointed out how carefully the productivity of machines is estimated, and showed to what length is carried the plan of providing every workman with definite instructions for every operation, even down to the time to be consumed. He made the point that with every phase of an undertaking so carefully prearranged it would be obviously impossible to crowd nine or ten hours' work into eight. Indeed, so hard was the limit of capacity crowded by the present program that workmen who can get out the work in the time prescribed are receiving anywhere from 30 percent to 85 percent more than those who cannot meet these high tension demands.

At this juncture a member of the committee inquired what would be the effect of the introduction of relays of workmen on the eight-hour basis. Mr. Du Brul replied: "The machinery manufacturing firms of the country are against relays in general. They do not want to divide responsibility and for that reason are now trying to do away as much as possible with night crews."

Returning to the subject of the probable abandonment of Government work by firms in the iron and steel industries and kindred trades, the commissioner brought out the fact that much Government work is now taken at cost or less for the sake of the reputation gained. "In the boiler business, for instance," he continued, "a manufacturer of a new type of steam generator will frequently contract to place his boilers in a United States battleship at a price which shows no profit, and may show actual loss, but for which he will be reimbursed by the publicity given to its merits in the Government tests and the consequent demand on the part of the merchant trade."

Mr. Du Brul touched on the fact that if the Government work were confined to a few contractors the tendency would inevitably be to a monopoly, with higher prices and poorer work, and the ultimate natural cry for Government shops. This latter was one of the things which he and his fellow manufacturers were looking forward to and he disgressed a moment to point out the sad experience of the Government in attempting to compete with private firms in the construction of war vessels.

He said that a practical difficulty that had occurred to every contractor was found in the indefiniteness of the bill under consideration, and he prophesied that such a "plunge in the dark" would cause endless litigation. To illustrate, he explained how in foundry practice conditions beyond the control of any human being would necessitate the heat being taken off on some days 10 or 15 minutes later than others. This he said was not an unusual condition but something that was happening all the time; but what was the foundryman to do under such circumstances? He could not secure another crew for five or ten minutes to finish the work and yet under the provisions of the bill if he permitted his regular force to work so much as one minute over the prescribed eight hours he would be liable for a heavy fine.

The speaker also assailed as "excessive" the proposed penalty of $5 per day and made the point that as business men he and his associates could not see the equity of the Government holding a man responsible for the acts of somebody else, as would be done in the case of a contractor where a violation was charged against a sub-contractor. Then he took up the subject of the system of inspection which would be necessitated, and pointed out how serious an item of expense this would prove, inasmuch as there are, under present conditions, no inspectors in many shops. Then he branched out on a topic which had never been more than touched on at any previous hearing, namely, the opportunities for graft and blackmail which would be open to these inspectors charged with reporting violations of the eight-hour day.

Replying to a question the speaker said that he believed the increased cost of commodities supplied to the Government under the eight-hour system of manufacture would represent an advance of at least 10 percent over present bids. Answering another question, he said that he believed the tendency of the average manufacturer would be to let Government work alone rather than to take it at increased cost. In proof he cited the case of the brass manufacturing firms of Cincinnati, which are now furnishing considerable quantities of material to the navy, but which, he said, were running 55 hours a week and could not differentiate or segregate, with the result that the Government would have to look elsewhere for its brass work in the event of the adoption of the eight-hour day.

In conclusion, a member of the committee asked Mr. Du Brul if he would be in favor of the bill if it applied to all work. He replied: "That is not the question under discussion; but I do not wish to dodge it, and will admit that the general tendency appears to be toward shorter hours. I presume all of us would like to work only four hours or only two hours per day and receive double salary; but I do not believe it within the province of the Government to say that no citizen shall work more than eight hours."

Earlier in the discussion Mr. Du Brul had declared that no testimony had been or would be submitted showing that conditions in the industrial world were intolerable and justifying the Government in stepping in and limiting the hours of work. He produced a mass of testimony to show that by no means all the workmen were eager for a restriction to eight hours' labor per day and referred particularly to the case of a prominent manufacturer in the metal trades who, desiring to increase the output of a certain section of his plant, made the proposition that each man could go home when he had completed, as a day's work, nine pieces of the product unler manufacture. "But did they avail themselves of that opportunity?" asked Mr. Du Brul. "No. They keep right at work, being on the piece work basis, and now turn out an average of seventeen pieces each per day, working full 10 hours, when they might if they choose work only five hours and yet make as much money as they formerly did in the full day."

CLEVELAND FOUNDRYMEN'S ASSOCIATION.

By invitation of the Cleveland Foundrymen's Association, most of whose members, though not all, belong also to the National Founders' Association, President I. W. Frank and Commissioner O. P. Briggs, of the latter organization, visited Cleveland on Wednesday, Feb. 17. In the afternoon of that day the local foundrymen met the visitors at the headquarters

of the Cleveland Foundrymen's Association in the Superior building and discussed matters of mutual interest. Wage agreements with molders in several important cities have expired or will soon expire and the officers of the National Founders' Association are seeking the views of foundrymen as to the basis on which new agreements should be made, in case new agreements are thought desirable.

Some time ago the Cleveland machinery foundries, whose agreement with Iron Molders' Union No. 218 expires on March 17, notified the union that they would not renew the existing agreement. The molders replied by asking for a conference, and committees from the two organizations have been appointed.

Messrs. Frank and Briggs explained to the Cleveland foundrymen the conditions existing in other cities and there was an interchange of views as to the warranted future basis, both in respect to wages and shop conditions. It is expected that the preliminary meeting between the representatives of the foundrymen and the molders, on the wage question will be held within the coming week.

On Thursday evening the Cleveland foundrymen gave a dinner to Messrs. Frank and Briggs at the Hotel Euclid. J. H. Webster, of the Variety Iron Works Co., Cleveland, formerly a member of the administrative council of the National Founders' Association, presided over the program of speechmaking that followed the dinner, and ably gave direction to the current of thought and comment. Mr. Frank was compelled by illness to go to his room early in the evening, and the presentation of the National Founders' Association plea for the co-operation of all foundrymen in its work fell to Mr. Briggs. He set forth in a businesslike and forceful argument the results that had come from associated effort, and showed how that even in the period of high wages and expensive production preceding the fall of 1903, when concessions seemed to be all on the side of the foundrymen, the association had given a return for all that it cost. He pronounced erroneous the impression prevailing with some that a foundryman could not belong to the National Foundrymen's Association unless he operated a union shop. Of the strength and discipline of the Iron Molders' Union something was said by way of emphasizing the need for a strong organization among employers —one that should carry weight and command respect. The value of the protection afforded by the N. F. A. was demonstrated by the presentation of some striking figures. Quoting from recent reports of Iron Molders' Union officers the speaker said that the union had increased its membership by 16,000 in 1903.

The Cleveland strike of 1900 was referred to by Mr. Webster and some features of that struggle were recalled. Of the foundrymen involved three were no more—Messrs. Dickey, McGuire and Lonergan. A fitting tribute was paid to each. The toastmaster referred to John A. Penton's labors in connection with that struggle, and called upon Mr. Penton, who responded with some reminiscences and a reinforcement of Mr. Briggs' argument for united action by foundrymen. The speaker took occasion to say some things on phases of N. F. A. work of which he felt he could speak with more freedom now that he had no official connection with the organization. Further remarks were made by H. C. Ryding, of the Lorain foundry department of the National Tube Co., by Jos. A. Stone, of the Riverside Foundry Co., formerly chairman of the Fourth District Committee, and by W. D. Sayle, of the City Foundry Co. It was the first social meeting of Cleveland foundrymen and as such was looked upon as a promise of stronger co-operation than ever in the matters upon which united action will be sought in the future. Among those present were the following:

C. J. Snow, Macbeth Iron Co.
W. C. Bruce, Bowler Foundry Co.
Anthony Carlin, Standard Foundry Co.
W. B. Green, J. C. Boyton and W. J. Somerville, Palmers & DeMooy Foundry Co.
B. F. Wade, Taylor & Boggis Foundry Co.
Wm. Greenbaum and Frank C. Schwoerer, Acme Foundry Co.
C. J. Langdon and I. W. Tucker, Fulton Foundry Co.
W. W. Balkwill, Cleveland Steel Casting Co.
I. W. Frank, president National Founders' Association.
J. H. Webster, Variety Iron Works Co.
O. P. Briggs, commissioner National Founders' Association.
W. D. Sayle and Jos. Schmitt, City Foundry Co.
Geo. Bartol, Otis Steel Works.
John A. Penton.
H. P. Ranney, American Ship Building Co.
Jos. A. Stone, Riverside Foundry Co.
D. J. Kilby, Kilby Mfg. Co.
Frank Fiebeger, Akron Foundry Co., Akron, O.
H. C. Ryding, Lorain Foundry Department, National Tube Co., Lorain, O.
Thos. M. Roche, secretary Cleveland Foundrymen's Association.

CITIZENS' INDUSTRIAL ASSOCIATION.

The annual convention of the Citizens' Industrial Association of America was held at Indianapolis this week. About 500 delegates were present and there was much enthusiasm. The eight-hour and anti-injunction bills were condemned in strong terms and the following telegram was sent to the Labor Committee at Washington, which has under consideration the eight-hour bill:

"The Citizens' Industrial Association of America, in convention assembled at Indianapolis, protests against the adoption of the Eight-Hour bill, and respectfully requests that if it is the intention to report such a bill, a hearing upon the same be accorded at a convenient date in the future, when this association may present its opposition."

The following resolutions were adopted:

"Whereas, a large number of cities of the country discriminate against certain citizens in the matter of placing public contracts by requiring the use of the union label on all public printing and union labor as a class in all cases;

"Therefore, be it resolved, that the Citizens' Industrial Association, in convention assembled, unreservedly condemns such a method and declares that it is a species of discrimination unalterably in conflict with the liberties and privileges that all citizens are entitled to enjoy under the constitution and laws of our counry.

"Be it further resolved, that the members of this association use their influence at all times and in all places against such methods."

A telegram of congratulation was sent to Governor Peabody, of Colorado, commending his course during the miners' strike. A resolution was adopted recommending that the next convention be held in New York City. The matter will be decided by the executive committee. The next convention will be held in November. The following nominating committee was appointed to select officers and report to the next convention: J. W. Van Cleve, St. Louis; E. F. Du Brul, Cincinnati; P. C. Oviatt, Rochester, N. Y.; J. H. Beek, St. Paul, Minn.; N. F. Thompson, Birmingham, Ala.

A resolution in regard to the bituminous coal situation was adopted. It declared that a strike is possible in the bituminous fields and as the United Mine Workers have assumed to dictate to the mine owners, the Industrial Association should protect the people in their rights and the "open shop" should obtain in the mines as elsewhere.

President Parry, in his address, said in part: "During this last year socialistic unions and labor trusts have become a serious menace to industrial welfare and to the perpetuity of American institutions. We expressly deny that we are opposed to the right of labor to organize, but we are firm in our determination that individual and property rights shall be respected by every organization, be it composed of workmen or other citizens. We are opposed to the closed shop, sympathetic strikes and restriction of output. We stand for the enforcement of law in industrial controversies; not only for its enforcement today, but to morrow and for all time. We are firm in the belief that individual incentive and enterprise should be untrammeled and encouraged to the uttermost. The interests of all classes, including those of labor, cannot avoid being injured by attempts upon the part of either Government or civil organizations looking to the arbitrary regulation of industry. Therefore, eight-hour, anti-injunction and national arbitration bills are to be utterly condemned as being dangerous innovations in government and certain to affect disastrously the national welfare."

LABOR NOTES.

A movement in favor of the open shop has been inaugurated at Springfield, Mass., as a result of the bridge and structural

iron workers demanding an increase of pay. The present agreement ends April 1, after which it is expected the employers will refuse to recognize the union.

The Builders' Association, of Detroit, which will make a fight for the open shop, now has 228 concerns on its list of membership. John J. Whirl, secretary of the Metal Trades Association, has been appointed commissioner of the Builders' Association and will direct its affairs in matters pertaining to labor. The association has already announced that in the future no agreements will be signed with any union, and the members reserve the right to employ whomsoever they wish.

One hundred and fifty moulders in foundries at Biddeford, Me., have gone on a strike against being put on piece work.

The strike of tonnage men employed by the New Haven Iron & Steel Co., New Haven, Conn., which caused a shutdown of the company's plant for eight weeks, has been adjusted and work has been resumed. The terms of the settlement are not announced.

Suits for damages will be instituted by the Parkersburg Iron & Steel Co., Parkersburg, W. Va., against the Amalgamated Association of Iron & Steel Tin Workers and individual members of the organization. The association ordered a strike of its members working in the plant and the company claims to have sustained losses by unlawful acts of strikers.

About 75 metal polishers and stove mounters of the Detroit Stove Works, Detroit, went on strike Feb. 19. The walkout is the result of an attempt by the unions to compel the employment of all men who were at work when business was rushing in 1903. On account of lack of orders the plant has been running with about half the force since the first of the month.

There is a prospect that every tin shop and roofing establishment in Toledo, O., will soon be an open shop. The tinners and roofers have demanded an increase of 65 cents a day, which employers declare is unreasonable. The employers say they will not grant the demand and hereafter will employ both union and non-union workmen as they please.

In spite of the recent adverse decision, the Ricard Boiler & Engine Co., Toledo, O., has filed an amended petition for injunction against the picketing of its shops by strikers. The new petition also asks for an injunction to restrain the union from warning boilermakers to stay away from Toledo and from injuring their business by publishing it as "unfair" in the trades union papers with a view to establishing a boycott.

A strike is now in progress on all work being done by Grainger & Co., in Louisville, Ky. The structural iron workers, who declared the strike, demand an advance to 40 cents an hour. Non-union men are being put to work on some of the contracts by the company.

The molders of the American Steel Casting Co., Chester, Pa., have returned to work. This will permit the operating of the plant in all departments, giving work to 600 men. The terms agreed upon were as follows: Molders in No. 1 shop, from $2.75 to $3.00 a day, with $3.50 on bonus work; No. 2 shop, from $14.50 to $16 a week, with $3.50 a day for bonus; coremakers to go back at the old rate.

Fifty molders employed at the Allis-Chalmers works at Scranton, Pa., went on a strike a few days ago on account of the refusal of the foreman to discharge a molder who came from Wilkesbarre and was put to work. It was alleged that the man was not a member of the union.

The Chicago Metal Trades association is holding conferences with representatives of the machinists' union, endeavoring to arrange for a reduction in wages to become effective May 1, when the present agreement expires. Manufacturers feel that it is imperative that wages be reduced.

The molders' agreements with foundry firms in Buffalo and Indianapolis belonging to the National Founders' Association expired some time ago and have not been renewed. A conference between representatives of the two organizations will be held in the near future to consider the basis of a new agreement.

The strikes at the Norton Iron Works, Ashland, Ky., and the Belfont Iron Works, Ironton, have been settled. Both sides made concessions.

LAKE SUPERIOR IRON MINES.

In our statistics of the shipments from Lake Superior iron mines in 1903, published last week, the shipments from the Savoy and Sibley mines on the Vermillion range, were reported together, there being a common hoisting plant for the two shafts and the two being treated statistically as one mine by the Steel Corporation. Of the total of 283,211 tons the Savoy produced 169,616 tons and the Sibley 113,595 tons.

The Pitt Iron Mining Co., which has been working a small force in its Miller mine in Minnesota for the past few months, is to begin hoisting in April and will make a fairly large shipment the coming season. This is probably the only property of this company that will make shipments this year. This mine pays a royalty of 35 cents a ton and has a 100,000-ton minimum.

The Canisteo Mining Co. will open two properties in T 56 R. 24, Minnesota, only about four miles east of the Mississippi river and Grand Rapids, with three-compartment shafts, and has already commenced work. They are the only properties in all that region of the Mesabi range that show any sign of activity. They were explored by E. J. Longyear and G. G. Hartley last year and while somewhat sandy and lean do contain a good deal of excellent ore. They lie just southwest of the old Dominion prospect, and close to the Holman, which was explored and abandoned by the Donora Mining Co.

The Republic Iron & Steel Co., at its Pettit mine, east Mesabi range, has installed a triple expansion compound condensing Prescott pumping plant of about 4,000 gallons capacity, and is now pumping half that. As the mine is further opened it is expected the pumping will increase. This mine has been the wettest on the Mesabi since the closing of the Penobscot, and has been drowned out two or three times. It is now probably secure.

Explorations are to begin in section 12 58-15, southeast of the find recently made in section 6 by G. A. St. Clair. This work will be on the ice of Embarras lake, to prove if ore exists underneath. Explorations have also been commenced on section 6 by Duluth lumbermen who have an option.

In section 28 59-15, land that Wm. Rock and associates recently secured from the Donora Mining Co., explorations are to commence by the Cleveland-Cliffs Iron Co., which has an option for the property. This land adjoins the large Swallow mine of the Donora company, and is a part of the tract the latter company supposed it owned.

A steel shaft house will be erected by the Penn Iron Mining Co. at its Republic mine, Marquette range. It will be of the standard type somewhat similar to that just built at the Lake mine of the Cleveland-Cliffs Iron Co.

At the new Howard mine, Mesabi range, of the Oliver Iron Mining Co., situated on the Chemung purchase, a shaft is going down through quicksand and will reach ore at about 100 feet. The ore at this property is of a very fine grade and a large tonnage will be made in 1905. In the immediate vicinity of this property, which is near the center of T 58 R 20, there are more new mines than at any other point in the Lake country. These include the Shenango, of the Clairton Steel Co., the St. Clair, Morris and Monroe, of the Oliver company, the Albany of Pickands, Mather & Co., and one or two others. This district is destined to take a very important position on the Mesabi.

The Manufacturers' Association of Pittsburg has appointed a committee of three to be a part of a committee of 21 to assist Director Hamerschlag, of the Carnegie Technical School, to formulate a course of instruction in the proposed school. The committee consists of Joseph T. Speer, W. H. McFadden and G. M. Cooper. This committee also represents the Pittsburg Foundrymen's Association and the National Founders' Association. A meeting of molders, machinists, patternmakers, etc., will be held in the Old City Hall, Pittsburg, early in March when expressions from the workingmen will be heard regarding the school. They will be addressed by Director Hamerschlag.

The Shenango Valley Steel Co., of New Castle, Pa., which was absorbed several years ago by the National Steel Co. and later became one of the subsidiary companies of the United States Steel Co., has at last been dissolved.

Mining Engineers at Atlantic City.

The winter meeting of the American Institute of Mining Engineers was to have been held in Baltimore, but owing to the fire the place was changed to Atlantic City, and hence the excursion originally planned from Baltimore had to be abandoned. The meeting opened on Tuesday, Feb. 16, and closed on Thursday, Feb. 18. The headquarters were at Hotel Rudolph. On Tuesday evening President A. R. Ledoux delivered his address entitled "The American Engineer of Today." The sessions of Wednesday morning, part of Wednesday afternoon and part of Thursday morning were given up to papers upon cast iron and steel. Altogether 49 papers were presented, but for the most part only those dealing with the iron industry were presented in full, the others being read by title. In addition to the cast iron and other iron and steel and kindred papers mentioned in these columns last week as scheduled for the meeting, the following were presented:

The Payne Magnetic Separator, by C. Q. Payne, New York.

Estimated Cost of Mining and Coking and Relative Commercial Returns from Operating in the Connellsville and Walston-Reynoldsville Districts, Pennsylvania, by Edward V. d'Invilliers, Philadelphia.

Method of Origin of the Magnetic Iron Ores of Iron County, Utah, by E. P. Jennings.

Equipment of a Laboratory for Metallurgical Chemistry, by Charles H. White.

The Use of High Percentages of Mesabi Ores, by W. A. Barrows Jr., Shenango Furnace Co., Sharpsville, Pa.

Notes on Cast Iron, by J. E. Johnson.

A Graphite Separator, by F. M. Zeller.

Considerable discussion took place on the papers upon iron and steel. Those participating were: President Ledoux, Dr. R. W. Raymond, James Gayley, Charles Kirchhoff, Edgar S. Cook, Dr. Richard Moldenke, J. P. Roe, F. E. Bachman, F. B. Fackenthal, Henry Souther, Dr. C. F. McKenna, A. E. Outerbridge Jr., and H. M. Lane. The paper which probably created more interesting discussion than any other was that of Mr. Outerbridge on the "Mobility of Molecules of Cast Iron." It was stated that it has long been known that cast iron expanded upon repeated reheating and that wrought iron and steel contracted slightly when subjected to the same treatment, but no one had ever attacked the problem scientifically. Therefore the results obtained by Mr. Outerbridge (which were published in *The Iron Trade Review* of Feb. 11 as presented by him to the Franklin Institute) far exceed anything that would have been considered possible in the past. One interesting application of the expansion of cast iron which had been used was referred to. During the Civil War a firm manufacturing shot would frequently get some of the product slightly under size and the inspector would reject them. It was found that by heating these shot two or three times they expanded sufficiently to pass inspection.

On Thursday afternoon the members visited the works of the Atlantic City Brick Co., who are making high grade pressed brick from sea sand and quicklime. The bricks are not baked, but are simply subjected to a steam pressure of 125 pounds per square inch for about 12 hours, and it is found that this high pressure and temperature harden the mortar sufficiently to give a good hard brick.

The members also inspected a very interesting electric railway which the Wireless Railway Co. has installed at Atlantic City. The cars are like ordinary electric trolley cars except that they receive their current from a series of contact points between the rails. These points are so arranged that they are dead until the car reaches them. When the car comes above one of the points, magnets under the car attract a small piece of iron in the box under the contact point and lift a small tube having copper ends into such a position that it connects the contact point with the supply wire, thus rendering it alive. A contact shoe on the car then takes the current from the contact point. As soon as the car passes from over the contact point and the action of the magnets is removed, the small iron core falls and the point becomes dead once more. These points are situated at suitable distances, those in the railway inspected being 16 feet apart. During the winter quite a remarkable test was made. The snow had drifted badly over the track and a car was sent over the line pushing an ordinary rotary snow plow. The current for both the car and the snow plow came from the contact blocks, and the instrument showing a maximum reading of 240 h. p. This installation can be made much more cheaply than the underground trolley, is less liable to get out of order and less liable to make short circuits to the surface. It entirely removes the objection of the overhead trolley and altogether seems to be a very good form of equipment.

The attendance at the meeting was smaller than it would have been if the sessions could have been held in Baltimore, but those present were all thoroughly interested in the papers presented and it is probable that this meeting will go down in the history of the institute as one of its most profitable.

The election of officers resulted in the choice of James Gayley as president. He was escorted to the chair on Thursday afternoon. Mr. Ledoux made a few appropriate remarks in introducing the new president and Mr. Gayley thanked the members of the Institute for the honor conferred upon him and stated that the previous president had done so well that he felt that the best he could do would be to follow his example closely.

The question of the location of the summer meeting was left to President Gayley and the secretary, Dr. R. W. Raymond.

Of the shorter iron and steel papers we present three below. Robert W. Hunt, of Chicago, presented the following paper under the title

Notes on Rail Steel.

I have repeatedly stated that the mechanical treatment of the metal forming a steel rail, during its manufacture, was comparatively of much greater importance than its chemical composition. Years of observation have confirmed and emphasized that fact. The comparison of the wear of the earlier steel rails with that of later ones, and to the great disadvantage of the latter, is still being constantly made by railway officials. And while some of us, with experience covering the whole history of the manufacture of steel rails, are aware of the great differences in the conditions governing their production at various periods, I do not think the engineering world generally appreciates the direct and imperative influence those variatons have had, and are having, upon the wearing quality of the rails.

In the earlier days, the steel was poured into ingots which would make but two 30-ft. rails of not exceeding 60 lb. weight per yard—giving a mass weighing, say about 1,400 lb., and of a section of about 12 in. square. Today the ingots are some 22 in. square, and weigh more than 4,000 lb. Of course, the interior of the larger ingots must remain hot and liquid longer than that of the smaller ones, and from this condition arises the steel rail maker's *bete noir*—segregation of the metalloids and piping of the steel. The smallest sectioned ingot will pipe, but with the increase of its size so will be that of the interior cavity. This tendency existing and being well known, it would seem that rather than being ignored, especial care should be exercised to avoid the evils arising from it.

In the earlier days of steel rail making, after the ingot had been rolled down to a bloom of 6 or 7 in. square, all cracks were carefully chipped out of it. Such defects could not be welded up by subsequent working, but if cut out to the deepest point, particularly if the forming of sharp corners was avoided, the steel would, when further rolled, draw from the bottom up; and so if the cavity was not too deep, a sound bar of rail would result. This chipping was performed under a steam hammer. Later, if while the bar was passing between the rolls of the rail mill defects were discovered, the rolling operation was suspended until they could be chipped out. Then, again, great care was taken that the steel bloom should not be overheated. There were from six to eight blooms, each of a size to produce one rail, charged at one time into a heating furnace; and skilled workmen attended to their heating, turning them over on the bottom of the furnace so that all sides should become of an equal temperature. If from any cause this man made a mistake, and sent his steel to the rolls in an unsatisfactorily heated condition, the head rail roller, or some other mill official, rejected it, and it was returned to him for further treatment. This meant that more or less care was exercised on each and every rail; but the daily production was, when viewed from today's standpoint, quite small. The first departure was to cease chipping the blooms at the rail rolls—the next, to make it one continuous process from the

first blooming of the ingot to the nnished rolling of the rails. This procedure stopped the intermediate chipping of the blooms under the steam hammer, and carried with it the rolling of more than one length rail, that is, the rolling of a mass of steel large enough to produce more than one rail length, and the subsequent sawing of this into two or more rails.

This new method of rolling had been made possible by the introduction of more or less automatic machinery; and the daily production of a given rail mill increased very rapidly. But, I regret to say, that the care which it was possible to bestow on the making of each individual rail decreased in an even greater ratio—an effect which was inevitable.

In the old days, a Bessemer converting house was equipped with two converters, each of about five tons capacity, which were gradually enlarged to 7, 10, 15, and even 20 tons, and additional converters added. Of course, the size of the house, blowing engines, cranes, etc., were all proportionately increased and the development of the plant has proceeded until, instead of about 12,000 tons of ingots per month coming out of one converting house, more than 70,000 tons per month are now produced. There is more and larger machinery, and it has been said such large product is the best evidence that everything must have been running smoothly. That is true so far as mere production goes; but the speed and momentum are against the exercise of the proper kind of care necessary to produce sound ingots of the highest quality of steel. This is old-fashioned doctrine, but it is true. What are we going to do about it? I am not at all certain that I know; but I do think that the condition should not be tacitly accepted, and no effort made toward better things.

Of course, if the same radical course should be pursued with rail ingots as is done with those intended for ordnance, armor or heavy shafting purposes, by which the upper portion of each ingot, amounting to quite one-fourth of its entire weight, is cut off and treated as scrap, we know the greatest danger from segregation and piping would be eliminated. But this procedure will reduce the output of finished rails, and in that and other ways add much to the cost of making them. But if it is necessary in order to obtain safe rails, should not the situation be boldly faced? If railways must pay more money, and can by so doing secure rails which will not only be safe against breakage under traffic, but also give better wear, will it not be economy for them to make the greater investment? That would be one way to meet the difficulty, but I believe there are others also.

Alexander L. Holley had more to do with the introduction in America of the Bessemer process for making steel than any other man; and, later, probably did more than any one else to make possible its greatly increased and cheapened output. Some years after that process was firmly established in this country, the Siemens-Martin or open-hearth process was developed, and Mr. Holley was convinced that it also had a great future in America. So outspoken was he in support of this, that on one occasion an intimate associate of his, and one of the "Bessemer family of boys," said to him: "It sounds strange for you, of all men, to advocate so strongly the merits of the open-hearth process." He replied: "You mark my words; the open-hearth process will live to attend the funeral of the Bessemer process in America." There are a number of the "boys" still alive, and great changes along the line of Holley's prophetic vision have occurred; so that to them its fulfilment does not seem as improbable as when it was made.

In my judgment, the one question of ore supply will, in time, compel the increased use in this country of the basic open-hearth process. We cannot forever continue the rejection of ores which are in every other quality suitable for steel making, because their phosphorus content is outside of the Bessemer limit. And if at the same time, by the use of the other process, we produce a better metal, at cost not much if any greater, the outcome is inevitable.

Phosphorus is the controlling element in rail steel. If that can be practically disregarded, no one will deny the ability to make a better article, no matter for what purpose it may be intended.

So far as rails are concerned, the theory relating to the difference in the wear of the steel made by the two processes is being subjected to the crucial test of practice. But no matter what steel is used, care must be exercised in making it; in pouring the ingots; in their handling and heating; and in the rolling and straightening of the rails.

While I have at different times prepared and presented to this institute specifications for the manufacture of rails, I feel that under all the existing conditions the present is not the time for the adoption of any specification as standard. For the last few years, commercial conditions have been such that there has been practically but one side to the market. Such is not now exactly the case. The rails of heavy sections have not been giving the anticipated service. Both Bessemer and basic open-hearth rails are being made in America, and placed in service, side by side. Foreign rails of both basic and acid Bessemer steel have been imported. Several of the large railway systems have contracted for rails under somewhat new specifications. Let us, before saying which or any are the best, await results of actual experience. But I repeat, no matter what chemical formula or which process of making steel is selected, unless care in manufacture is exercised, all will have been in vain.

Under the title

Specifications for Pig Iron and Iron Castings,

Robert Job, of Reading, Pa., presented the specifications of the Philadelphia & Reading Railway, with some comments:

Up to five years ago the pig iron used by the Philadelphia & Reading Railway Co. had been obtained solely upon the appearance of the fracture, but as the service was unsatisfactory an investigation was made to determine the quality best adapted to the requirements of the company. It was found in the first place that the proportions of phosphorus and of silicon were high, which resulted in the castings having a rather low tensile strength and being weak under impact. After a study of the quality and conditions of the scrap of the company, as well as of the service desired, specifications were drawn up substantially in the form of those herewith appended, limiting the proportion of phosphorus to 0.5 percent, and the proportion of silicon to about 1.5 percent, holding the latter component in practice to about 1.75 percent also; as some of the scrap was rather high in sulphur, a minimum of 0.4 percent was placed on the manganese content of the pig iron, and ferro-manganese was used in the ladle. The result of these changes was to produce a tough, close-grained, easily-machined casting of high resistance under impact.

By the end of the first year after beginning to use this iron, the breakages had decreased to such an extent that the company's supply of scrap was largely cut off, and by the end of the second year the supply had decreased to so low a point that it became necessary to get the scrap for the cupola furnaces elsewhere, and to purify it by an additional treatment.

SPECIFICATIONS FOR IRON CASTINGS, PHILADELPHIA & READING RAILWAY CO.

1. *Physical Requirements.*

All castings must be of uniform quality, and of solid iron free from physical defects and excessive shrinkage strains, finished in a workmanlike manner, free from sand, and in close accordance with drawings. Castings purchased under Class 1 or Class 2 must be of gray iron throughout and easily machined.

2. *Chemical Requirements.*

Class 1, Medium Iron.—Engine cylinders, gears, wheel centers, smoke stacks, etc. The iron must be close grained and tough. The composition must be silicon, from 1.4 to 2; sulphur, not exceeding 0.085; manganese, not exceeding 0.7; phosphorus, not exceeding 0.6 percent.

Class 2. Soft Iron.—Small castings for general car and roadway use. The composition must be silicon, from 2. to 2.8; sulphur, not exceeding 0.085; manganese, not exceeding 0.7; phosphorus, not exceeding 0.6 percent.

Class 3. Brake shoes and other castings for frictional wear. The iron must be hard and tough. The composition must be silicon, from 2. to 2.5; sulphur, not exceeding 0.15; manganese, not exceeding 0.7; phosphorus, not exceeding 0.7 percent.

3. *Method of Inspection.*

Upon receipt of a shipment, a thorough inspection will be made, and only those castings will be considered which meet the requirements of Section 1. From such castings borings will be taken from at least one in each fifty or fraction there-

of, and the composition must be within the stated limits or the shipment will be rejected.

4. *Rejected Material.*

All rejected material will be returned at the expense of the shipper, and all castings which fail in service owing to defects of manufacture must be replaced free of cost.

SPECIFICATIONS FOR PIG IRON, PHILADELPHIA & READING RAILWAY CO.

1. *Physical Requirements.*

Shipments must be of uniform quality, and free from sand, dirt, slag, or other foreign matter. Pigs must be broken, or be of such size as to be easily handled.

2. *Method of Sampling.*

Upon inspection, three pigs will be selected at random from each carload or fraction thereof, and a sample of drillings obtained by boring into the face of a fractured end of each of the three with a blunt, wide-angled two-inch drill, to a depth of not less than two inches, care being taken to have the drillings uniformly fine and free from sand or other foreign matter. The samples from these three pigs will then be thoroughly mixed, and this final sample upon analysis must conform to the following composition, or the carload represented will be rejected.

3. *Chemical Composition.*

The chemical composition must be silicon, from 1.5 to 2.5; manganese, from 0.4 to 0.75; phosphorus, not exceeding 0.50; sulphur, not exceeding 0.04 percent.

4. *Rejection.*

In case of rejection at the shops, the material will be returned at the expense of the shipper.

A short paper from Thos. D. West was read on

Direct Metal and Cupola Metal for Iron Castings.

A short time ago, I had occasion to cast plates 1 in. in thickness, with direct metal containing Si, 0.51; S, 0.045; Mn, 0.75; and P, 0.094 percent. Much to my astonishment I found that there was no trouble in planing them, whereas if cupola metal of like composition had been used, the planing would have been a difficult operation. In view of the interest taken at the present time in the subject of using direct metal for foundry purposes, a few remarks on my observations, while handling this metal in daily routine, may not be amiss, and may create discussion.

I have often noticed a greater fluidity or life in furnace metal when compared with the cupola product. Iron can be seen flowing down the furnace runners from 50 to 100 feet before reaching the last pig in very satisfactory shape, while cupola metal might solidify before it had reached one-half the distance. I have seen Bessemer iron in a 30-ton ladle held for nearly an hour and a half during repairs to a crane; and after skimming off the coke dust, it had to be cooled off considerably before being cast.

As a general proposition it is known that the comparatively lower sulphur content and the higher temperature of direct metal over the same iron remelted in the cupola has much to do with its greater life, yet there are some problems connected with this phenomenon which would seem to call for further study. For instance, furnace metal containing more than one percent silicon holds carbon, which is separated as "kish." This separation does not take place to any great degree while the metal is very hot, but during its gradual cooling, at times, the kish is given off in such large quantities as to cover the ground for an area of from 20 to 30 feet around the ladle.

Perhaps this throwing out of the excess carbon then makes the life of the metal shorter thereafter. It would be well to ascertain the carbon content of a ladle of iron during the stages of the cooling process, and thus determine the effect of the carbon reduction more accurately.

In making "direct metal" castings the separation of kish becomes a nuisance, although it is more generally confined to the higher silicon metals. The higher carbon undoubtedly has much to do with keeping metal with the lower quantities of silicon softer than if it were a cupola product of like composition excepting the total carbon content. Perhaps some of our furnace friends can throw light on this interesting matter.

Those in Attendance.

Among the members who attended the meeting were the following:

Walter A. Barrows Jr., Sharpsville, Pa.
F. E. Bachman, Port Henry, N. Y.
Cyrus Borgner, Philadelphia.
R. H. Chapman, Washington, D. C.
Edgar S. Cook, Pottstown, Pa.
Theodore Dwight, New York.
David T. Day, Washington, D. C.
Stanley G. Flagg Jr., Philadelphia.
B. F. Fackenthal Jr., Easton, Pa.
Lewis W. Francis, New York.
James Gayley, New York.
H. P. Gillette, New York.
Henry B. Hibbard, New York.
C. T. Holbrook, De Kalb Junction, N. Y.
Jos. E. Johnson, Longdale, Va.
C. Kirchhoff, New York.
H. M. Lane, Cleveland.
B. B. Lawrence, New York.
Albert R. Ledoux, New York.
J. H. Lee, Baltimore, Md.
Jawood Lukens, Philadelphia.
Chas. A. Liddell, Golden, Colo.
E. H. Messiter, New York.
E. C. Means, Low Moor, Va.
Chas. A. Matcham, Allentown, Pa.
Chas. McKenna, New York.
Richard Moldenke, Watchung, N. J.
J. King McLanahan, Hollidaysburg, Pa.
Robert Nye, Placerville, Idaho.
Alex. E. Outerbridge Jr., Philadelphia.
Geo. Ormrod, Emaus, Pa.
E. W. Parker, Washington, D. C.
Richard Peters Jr., Philadelphia.
S. M. Pitman, Providence, R. I.
R. W. Raymond, New York.
Jas. P. Roe, Pottstown, Pa.
T. A. Rickard, New York.
Jos. Struthers, New York.
Harrison Souder, Johnstown, Pa.
H. H. Stoek, Scranton, Pa.
J. M. Sherrard, High Bridge, N. J.
Henry Souther, Hartford, Conn.
Knox Taylor, High Bridge, N. J.
Walter Wood, Philadelphia.
Olaf Wenstrom, Boston.
Walter Harvey Weed, Washington, D. C.
H. V. Wallace, Sonora, Mex.
C. Weichett, visitor.
Frank M. Zeller, Philadelphia.
M. Otagawa, Tokio, Japan.

The Davenport Locomotive Works, builders of light locomotives, Davenport, Ia., recently secured two export orders for locomotives. One of the orders was for four standard gauge switching engines, to go to the Cerro de Pasco copper mines at Cerro de Pasco, Peru. The engines are to be built complete in the Davenport shops and will go from New York via vessel to Panama, thence across the Panama railroad to another vessel on the Pacific. These engines are to work 600 miles inland at an elevation of 14,000 feet and require large fire boxes and extra draught to furnish oxygen enough for the combustion of poor coal at such a high elevation. This order was secured in competition with American, German and English manufacturers. The same company has secured an order for a 21-ton narrow gauge freight engine for use on a railroad of the Miller Plantation Co. in the State of Vera Cruz, Mexico.

The National Corundum Wheel Co., heretofore located at Fort Hill, Genesee county, N. Y., will move to Buffalo, where the head office will be located. The officers and directors of the company are: President, W. L. Baker, Buffalo; vice president, L. H. Knapp, Buffalo; secretary, H. D. Gates, Buffalo; treasurer, J. F. Spohn, Clayville; director, W. H. Farnsworth, Buffalo.

The Silberman Iron Co., of Cleveland, has been incorporated for $50,000 to deal in iron and steel scrap. J. W. Edwards will be president and A. Rotter, formerly of Norwalk, will be treasurer. The yards of the company are at 192-216 Scranton avenue, Cleveland.

PECULIAR PROFIT SHARING IN TIN PLATE MILLS.

Not being successful in securing a reduction in the tin plate scale of the Amalgamated Association a number of the lodges of that organization, affiliated with independent mills, have evolved a scheme of evading the spirit of the scale if not the scale in fact, which gives the manufacturer practically the advantage of a 20 to 25 percent reduction in wages. The scheme has been accepted by the employes of the Alcania Co., Avonmore, Pa., of which M. M. Garland, formerly president of the Amalgamated Association, is vice president and by the employes of the Canonsburg Sheet & Tin Plate Co., Canonsburg, Pa. The men employed at the former plant are expected to return to work this week under this system, while at Canonsburg they have worked under it for several weeks.

According to this plan the company is permitted to retain 20 percent in one case and 25 percent of the men's wages in the other for future profit sharing. At the Alcania plant a 5 percent dividend is to be paid on the capital stock, and after paying all expenses, deductions being made for depreciation, etc., the men are to share with the company the remainder of the profits. Of course if all these payments have been met and there is nothing remaining the men receive nothing and in addition they have worked for the period, whether a month or a year, at a reduction from the scale of 20 to 25 percent. The Amalgamated Association officials declare that they cannot prevent such a profit sharing arrangement, so long as the scale wages are paid by the company; that they have no way of dictating what the men shall do with their money after they have earned it; that the employes might leave half of it with the firm or even all of it, if they desired.

However, the Jefferson lodge, composed of employes of the McClure Tin Plate Co., Washington, Pa., wants to work under such an arrangement, as this plant has been shut down because the company cannot operate at a profit at the present market. The members of this lodge have petitioned other lodges of the association to join with them in calling a special convention of the tin plate lodges to pass on the regularity of this practice, and if it is contrary to the provisions of the scale they want to have a ruling to this effect. If the Amalgamated Association cannot prevent this practice it is probable that the American Sheet & Tin Plate Co. will also insist on some such plan, while other independent manufacturers will request that their men go into such a profit sharing scheme. The outcome is being watched with interest, as the very existence of the Amalgamated Association is now threatened as a result of the keen competition between the mills of the United States Steel Corporation and those of independent companies, many of the latter being at a disadvantage so far as raw material is concerned and eager to reduce cost of manufacture by securing lower wages.

Fiftieth Anniversary of P. & F. Corbin.

On the evening of Feb. 14, the hardware manufacturing company of P. & F. Corbin, of New Britain, Conn., celebrated its fiftieth anniversary. A banquet was held at which Philip Corbin occupied the place of honor, while on his left was John P. Talcott, an original director of the corporation, and at other tables were placed the older workmen, some of whom were in Mr. Corbin's employ on the day of the incorporation, and are still on the pay roll. Andrew Corbin, who was to have shared in the honors, was unable to be present on account of illness. The esteem in which he is held was shown in the cheers that greeted every mention of his name. Mr. Philip Corbin made an extended and very interesting address, telling of the early struggles of the company. He was presented with an album containing photographs of the executive staff of the company and of many of the old employes. Each photograph was signed by the donor, and some wrote a few lines expressing their high regard for their employers and hearty wishes for the prosperity of the company.

Work on the erection of stacks Nos. 2 and 3 of the Carnegie Steel Co., South Sharon, Pa., is being pushed as rapidly as possible by the Pennsylvania Engineering Co. It is probable that the one furnace will be blown in early in April while the other stack will be ready in July.

PRESSED STEEL CAR CO.'S REPORT.

The Pressed Steel Car Co., whose annual report was briefly outlined in these columns last week, paid to stockholders $125,000 more in dividends in 1903 than in 1902. There was added to profit and loss surplus $237,506. President Hoffstat, in his report, says:

"We built during the year 20,683 all-steel and composite cars, and 4,481 under-frames. It is unfortunate that the volume of business of the first six months did not continue throughout the year, as we could then have demonstrated what could be accomplished with our plants working to their capacity. However, the breathing spell caused by the business depression gave us the opportunity of analyzing our methods. General conditions were bettered and methods improved with the result of materially reducing our costs and improving the quality of our work. The figures portraying this result will, we trust, show in future operations.

"We have expended in new construction on your company's properties during the year the sum of $438,727.18. The larger portion of this amount was expended in the erection of a new plant for the manufacture of forgings at our Allegheny works and the erection of the new general office building at McKees Rocks. We have made the usual depreciation charge of $260,000, and have continued the practice of charging all repairs and renewals to cost of production (the expenses on this account amounting to $529,000). We have also written off $650,000 from inventory account to represent changed conditions and actual values as of the present time and have carefully weighed and counted all material at both McKees Rocks and Allegheny plants to prove the correctness of the amount submitted. The depression in business made it possible to close at different times each plant for this purpose. We have gradually increased our facilities for the manufacture of products allied to our usual work and have operated on various new lines. It has, of course, been largely experimental and has not appreciably increased our income, but we have every reason to anticipate profitable results for the future."

"The value of business on hand on Jan. 1 is less than at any time in previous years, but railroads are indicating a desire to purchase cars and equipment as soon as they can make proper arrangements, so that we are hoping very shortly to have our order books in reasonably good condition. The Western Steel Car & Foundry Co. has considerable work booked and will shortly be running in full. We confidently hope that the improvement in business which seems to have begun will enable us to run all our plants to their capacity.

"The plan put in operation last year of carrying at the rate of 4 percent per annum your company's preferred stock for such of our employes as wished to avail themselves of this opportunity of acquiring it, has been and is now being availed of, and we believe in working to the satisfaction of both the employes and the company.

"At the quarterly meeting of the Board of Directors, held Jan. 27, the quarterly dividend of 1 percent was declared on the common stock of your company, as over 13 percent had been earned in excess of the preferred dividend and other charges during the year. The wisdom of not declaring dividends, except from the surplus earnings of the year previous, shows for itself, and we hope that our action will meet the approval of every stockholder, as, while desiring to be conservative, we wish to give full and proper consideration to each class of stockholders which we represent. Following our practice, the company is prepared out of its large cash balances to anticipate the payment of 5 percent gold notes due in 1905 on a basis satisfactory to the company."

A syndicate, made up largely of Wheeling and Moundsville, W. Va., banks, has purchased the $1,000,000 of the original issue of $2,500,000 first mortgage 6 percent bonds of La Belle Iron Works. The transaction gives the company sufficient working capital for the operation of its plants.

The new mixer recently installed in the steel plant of the Tennessee Coal, Iron & Railway Co., at Ensley, Ala., was used for the first time Feb. 15.

PRODUCTION OF IRON ORE IN 1902.

Some months later than usual the annual statistics of iron ore production are published by the United States Geological Survey. The monograph covering iron ore production in 1902 is prepared as heretofore by John Birkenbine, of Philadelphia. It opens with the statement that the production of iron ore in the United States in the year 1897 exceeded that of any preceding year, and since that date the annual output of the country has shown successive augmentation, until in the calendar year 1902 the total reached 35,554,135 long tons, valued at $65,412,950, an increase of 6,666,656 tons over 1901, or 23 percent. No other country has at any time reported a yearly production so great as that of the iron ore mines of the United States in 1898 and in subsequent years. In the report for the year 1901 it was stated that the largest quantities of ore mined in any other country, according to official statistics, were 18,664,772 long tons mined in Germany and Luxemburg in the year 1900, and 18,031,957 long tons mined in Great Britain in the year 1882.

The amount of red hematite ore mined in the year 1902 in the United States amounted to 30,532,149 long tons, or 85.9 percent of the total for the United States, an increase of 6,526,124 long tons, or 27.2 percent over the 1901 total of 24,006,025 long tons of red hematite.

Minnesota was the most important contributor of this class of ore, followed by Michigan and Alabama.

The total amount of brown hematite mined was 3,305,484 long tons, or 9.3 percent of the output for the country, an increase of 288,769 tons, or 9.6 percent over the 1901 total of 3,016,715 long tons of brown hematite. Alabama was the principal contributor, followed by Virginia and West Virginia and Tennessee.

Of the magnetic variety, 1,688,860 long tons, or 4.7 percent of the total for the United States, were mined in 1902, a decline of 124,216 long tons, or 6.9 percent from the 1901 total of 1,813,076 long tons of magnetite. Pennsylvania continued to be the principal producer, followed by New York and New Jersey.

The amount of carbonate ore mined in 1902 was 27,642 long tons, a decline of 24,021 long tons, or almost one-half of the 1901 total of 51,663 long tons. Nearly all of this carbonate ore was mined in the state of Ohio, a small amount being supplied by Maryland.

The quantities of the different varieties of iron ores contributed by the various States in 1902 are presented in the following table according to the importance of the States as producers:

Production of iron ore in the United States in 1902, by varieties.—LONG TONS.

State or Territory.	Red hematite.	Brown hematite.	Magnetite.	Carbonate	Total.
Minnesota	15,137,650	.....	.....	.....	15,137,650
Michigan	11,079,124	.....	56,091	.....	11,135,215
Alabama	2,565,635	1,008,839	.....	.....	3,574,474
Virginia and W. Virginia	31,677	953,128	3,153	.....	987,958
Tennessee	370,643	503,899	.....	.....	874,542
Pennsylvania	20,441	185,846	616,635	.....	822,932
Wisconsin	758,216	25,680	.....	.....	783,896
New York	91,075	12,676	451,570	.....	555,321
New Jersey	.....	.....	441,879	.....	441,879
Georgia and N. Carolina	117,812	216,242	30,836	.....	364,890
Montana, New Mexico, Utah and Wyoming	255,269	18,079	88,686	.....	362,034
Colorado	4,375	288,922	.....	.....	293,297
Kentucky	42,195	28,811	.....	.....	71,006
Missouri	57,937	8,371	.....	.....	66,308
Connecticut, Massachusetts and Vermont	.....	29,093	.....	.....	29,093
Maryland	.....	19,382	.....	4,985	24,367
Ohio	.....	.....	.....	22,657	22,657
Texas	.....	6,516	.....	.....	6,516
Total	30,532,149	3,305,484	1,688,860	27,642	35,554,135

In addition to the iron ore mined, 65,246 long tons of zinc residuum was used as iron ore in 1902. The amount of "blue billy" or ore from iron pyrites used in the manufacture of sulphuric acid, is not stated. In 1902 192,285 long tons of concentrated ore was produced, this being included in the above table. In addition to the magnetically concentrated ore a considerable amount of magnetically cobbed ore was obtained in New Jersey, this method being adopted in place of sorting in the mine, the rock and ore being broken to convenient size, brought to the surface, and the iron ore removed from the rock by means of magnetic concentrating machines.

The imports of iron ore in 1902 were 1,165,470 long tons, valued at $2,583,077. From Cuba came 696,375 tons, practically the entire output of 699,734 tons made by the Inragua Iron Co., Ltd., the Spanish-American Iron Co., and the Cuban Steel Ore Co. in that year, these being the largest year's shipments from Cuba. From Spain 153,527 tons came in 1902; from Newfoundland and Labrador, 81,920 tons, and from Quebec and Ontario, 203,824, practically all from the Michipicoten range. From French Africa there came 19,167 tons.

A Tribute to John R. Russel.

As a tribute of friendship and a recognition of his long service as treasurer of the National Founders' Association, a number of gentlemen who have been officers or members of the administrative council of the association and are known as its "alumni," gave a dinner on the evening of Feb. 14 in Detroit to John R. Russel, secretary and treasurer of the Russel Wheel & Foundry Co. President I. W. Frank, of the N. F. A., presided. Toasts were responded to in a felicitous manner and Mr. Russel was presented a handsome chime clock, representing one of the most elaborate achievements of the clockmaker. The clock stands eight feet high, is handsomely carved, and has plate glass sides. The works are of English make.

Among those present were the following: Maj. Babcock, Buffalo; J. D. Leary, Queen City Foundry Co., Cincinnati, O.; James McNaughton, American Locomotive Co., Dunkirk, N. Y.; W. D. Sayle, City Foundry Co., Cleveland, O.; T. J. Drummond, Montreal Pipe Foundry, Montreal; P. W. Gates, Allis-Chalmers Co., Chicago; H. W. Hoyt, Allis-Chalmers Co., Chicago; O. P. Letchworth, Pratt & Letchworth Co., Buffalo; J. M. Taylor, Taylor-Forbes Co., Guelph, Ont.; George Q. Thornton, Carondolet Foundry Co., St. Louis; J. H. Webster, Variety Iron Works, Cleveland; M. H. Barker, American Machine & Tool Co., Boston; I. W. Frank, United Engineering & Foundry Co., Pittsburg; A. C. Pessano, Great Lakes Engineering Works, Detroit; H. M. Leland, Leland & Faulconer Mfg. Co., Detroit; John A. Penton, Detroit; O. P. Briggs, National Founders' Association; Henry C. Potter Jr., Detroit.

Milwaukee Coke & Gas Co.

The Milwaukee Coke & Gas Co., Milwaukee, Wis., has opened an office at 800 Fisher building, Chicago, in charge of Morton Otis, for the sale of Solvay foundry coke, etc., in the Chicago territory. Mr. Otis will be assisted by Clarence M. Schwerin, formerly assistant general superintendent of the St. Paul, Minn., plant of the Griffin Wheel Co., who has had considerable experience in cupola practice. The company's by-product ovens, works and storage yards, etc., are located on the tracks of the Chicago & Northwestern and Chicago, Milwaukee & St. Paul railways, at Milwaukee, where, owing to their advantageous location, prompt deliveries of its product can be made to any point in the States of Wisconsin, Illinois, Minnesota, Iowa and Michigan. For the benefit of the Chicago trade, storage yards have been established at 221 North Branch street, on Goose Island, in that city, where the company will have on hand in addition to foundry coke, all sizes of crushed coke, carefully screened for forging, cooperage work, brass foundries, etc. Foundries or manufacturers not having their own sidings or facilities for the storage of large quantities of coke at their plants will be supplied with lots of one ton up either in thier own or the company's wagons, special facilities having been made at the yards for the accommodations of team trade. The company states that it has a large market for crushed coke not up to first foundry grade in structure and analysis, and that foundrymen will be supplied only with a selected, uniformly strong, fast and hot melting coke, containing practically no breeze.

The International Harvester Co. at its plant in South Deering, Ill., has posted notices that work will be resumed March 1 and employment given to 600, perhaps 800 men. The plant has been closed down since Dec. 26.

EASTERN PENNSYLVANIA.

HARRISBURG, Feb. 23.—Western railroads and foreign companies have placed some good-sized rail contracts with Pennsylvania companies within the last few weeks, and it is stated by officials of a number of rail-making corporations that there is considerable additional business in sight. The Pennsylvania and Cambria Steel companies have taken a number of rail orders since the first week of the month and the Lackawanna has taken among others a large contract for the St. Paul, Minneapolis & Sault Ste. Marie railroad, which was for 10,000 tons to be shipped over the lakes.

The Pennsylvania company has started its rail mill at Steelton, which rolls domestic orders and those for street railways which have been good-sized buyers this year so far, while the foreign orders are being run out at Sparrow's Point. The company is starting more departments at Steelton and at Lebanon has given orders to push its new coke plant.

The Robesonia Iron Co. has installed two new Wheeler water tube boilers and new pumps at its blast furnace at Robesonia.

The Thomas Iron Co. will start one of its Lock Ridge furnaces and may put others into operation before another month.

The Reading Stove Co. reports a good year and has reelected as directors, F. L. Connard, W. H. Orr, Charles Breniser Sr., William H. Luden, James Nolan, D. F. Printz and Edgar Amole.

The Susquehanna Iron & Steel Co. has been operating some of its mills in Lancaster county, but the conditions with plants in that section are not very encouraging. York agricultural and other works are doing well on foreign work. The demand for farm machinery from this section appears to be better than ever.

About Reading conditions are getting better. There are more furnaces in blast than a month ago and others will be started. Preparations are being made by three Schuylkill Valley companies to resume furnace work this spring.

The Lebanon Rolling Mills are putting in new puddle furnaces. The West End mill will have three, one of which has been started.

The Delaware, Lackawanna & Western Co., whose Scranton car shops were damaged $100,000, will rebuild them.

The Dent Hardware Co. has occupied its new Catasauqua foundry and will build other departments.

The affairs of the Bernville Foundry & Machine Works are in the Berks county courts and a decree of partition has been asked.

Among the companies chartered last week were: Imperial Machine Co., Pittsburg, capital $10,000; Flannery Bolt Co., Pittsburg, capital $9,000.

The Penn Bridge Co., of Beaver Falls, will probably be awarded the contract for the new State bridge over the Lehigh river at Allentown. The bids range from $200,000 to $230,000.

Henry Pels & Co., 68 Broad street, New York, have received orders for their patent beam shears and punching machines from leading concerns in Baltimore and vicinity. The orders call for immediate delivery, and the machines will be used for the large amount of structural steel work necessitated in consequence of the recent fire.

The Novelty Machine Works, East Liverpool, O., of which E. G. Dean is proprietor, are making a specialty of iron and steel molds for porcelain electric supplies. Mr. Dean has had 10 years' experience in this class of work and has been very successful.

Fire in the heading department of the Lake Erie Iron Co., Cleveland, Feb. 22, caused a loss of $12,000. The company manufactures nuts and bolts.

The will of the late Senator Hanna was filed Feb. 23. The property, whose estimated value is $3,000,000, is left to the widow, son and two daughters.

The Monarch Coupler Co., Ltd., of Detroit, announces that it has secured the Thornburgh patents for draft riggings and will continue their manufacture and sale.

NATIONAL METAL TRADES ASSOCIATION.

Arrangements have been made with the Hotel Walton, Philadelphia, for the use of its assembly room for the convention of the association on March 23 and 24. H. N. Covell, of the Lidgerwood Mfg. Co., Brooklyn, N. Y., will preside. The convention promises to be the most enthusiastic of all the association has held. Papers on important subjects are being prepared by a number of members.

The following annual district meetings, under the auspices of the N. M. T. A., have been arranged for up to date: District No. 1, March 2, Trades Club, Boston, 3 p. m.; district No. 2, March 3, Cooley House, Springfield, Mass., 2 p. m.; district No. 3, March 2, New York Metal Trades Association, 203 Broadway, New York, 2 p. m.; district No. 4, Feb. 25, Yates Hotel, Syracuse, N. Y., 2 p. m.; district No. 5, March 4, Manufacturers' Club, Philadelphia, 3 p. m.; district No. 6, March 3, Reed House, Erie, Pa., 2 p. m.; district No. 7, March 8, Cincinnati Metal Trades Association rooms, Cincinnati, 1:30 p. m.; district No. 8, March 1, Employers' Association, Reibold building, Dayton, O., 4 p. m.; district No. 9, March 14, Toledo Club, Toledo, O., 10 a. m.; district No. 11, March 4, office of Commercial Electric Co., Indianapolis, Ind., 2 p. m.; district No. 12, March 1, Chicago Metal Trades Association rooms, Chicago, Ill., 3 p. m.; district No. 13, March 2, Employers' Association rooms, Quincy, Ill., 10 a. m.

Commissioner DuBrul attended the meeting of the Citizens' Industrial Association of America at Indianapolis on Feb. 22.

A foremen's meeting of the Cincinnati Metal Trades Association has been announced for Thursday evening, Feb. 25, at the rooms of the association. P. G. March, of the Cincinnati Shaper Co., and Fred Holz, of the Cincinnati Milling Machine Co., will read papers on the respective merits of the shaper and milling machine for the classes of work to which they are best adapted. Sherman Schauer, of the Cincinnati Machine Tool Co., will read a paper on the advantages of the upright vs. the radial drill, to which Mr. Norris, of the Bickford Drill & Tool Co., will reply, exploiting the value of the radial drill. Following this Philip Fosdick, of the Fosdick Machine Tool Co., will give a short talk on "How to Keep Busy in Dull Times." George Lang, of the Cincinnati Planer Co., will give a short address on "How Can We Lessen the Time Willfully Lost by Our Men?"

The contract for the Girod street steel shed, New Orleans, has been awarded to the Brown-Ketcham Iron Works, Indianapolis, their bid being as follows: 870,000 lb. steel at 2.90c, $25,230; other materials, including 32,000 lb. of cast iron, at 2c, $2,599; total, $27,829. The material is to be furnished in 70 days. Other bids were as follows on the steel part of the contract: South Pittsburg Iron Works, 3.24c; Virginia Bridge & Iron Co., 3.40c; New Castle Bridge Co., 3.65c; Milwaukee Bridge Co., 3.50c; Riter & Conley Mfg. Co., 4.10c; Champion Iron Co., 3.45c; American Bridge Co., 3.80c; Midland Bridge Co., 4.04c; West Virginia Bridge & Construction Co., 4.25c; Brackett Bridge Co., 3.95c; Penn Bridge Co., 4c; Belmont Iron Works, 3.44c; Kenwood Bridge Co., 3.48c; Phœnix Iron Co., 3.75c; McClintic-Marshall Construction Co., 3.38c; Worden-Allen Co., 3.18c. The time in which the bidders agreed to deliver the material varied from the 70 days of the successful bidder to 200 days.

From the Vulcan Iron Works Co., Toledo, O., and the J. D. Smith Foundry Supply Co., Cleveland, have been received 1904 diaries with maps and valuable statistical data.

The Penn Shovel Co., Corry, Pa., has signed a contract with the Business Men's Association, of Warren, O., to move its plant to that city.

The Bessemer, rail, blooming and billet mills of the Pennsylvania Steel Co., Harrisburg, Pa., were placed in operation this week.

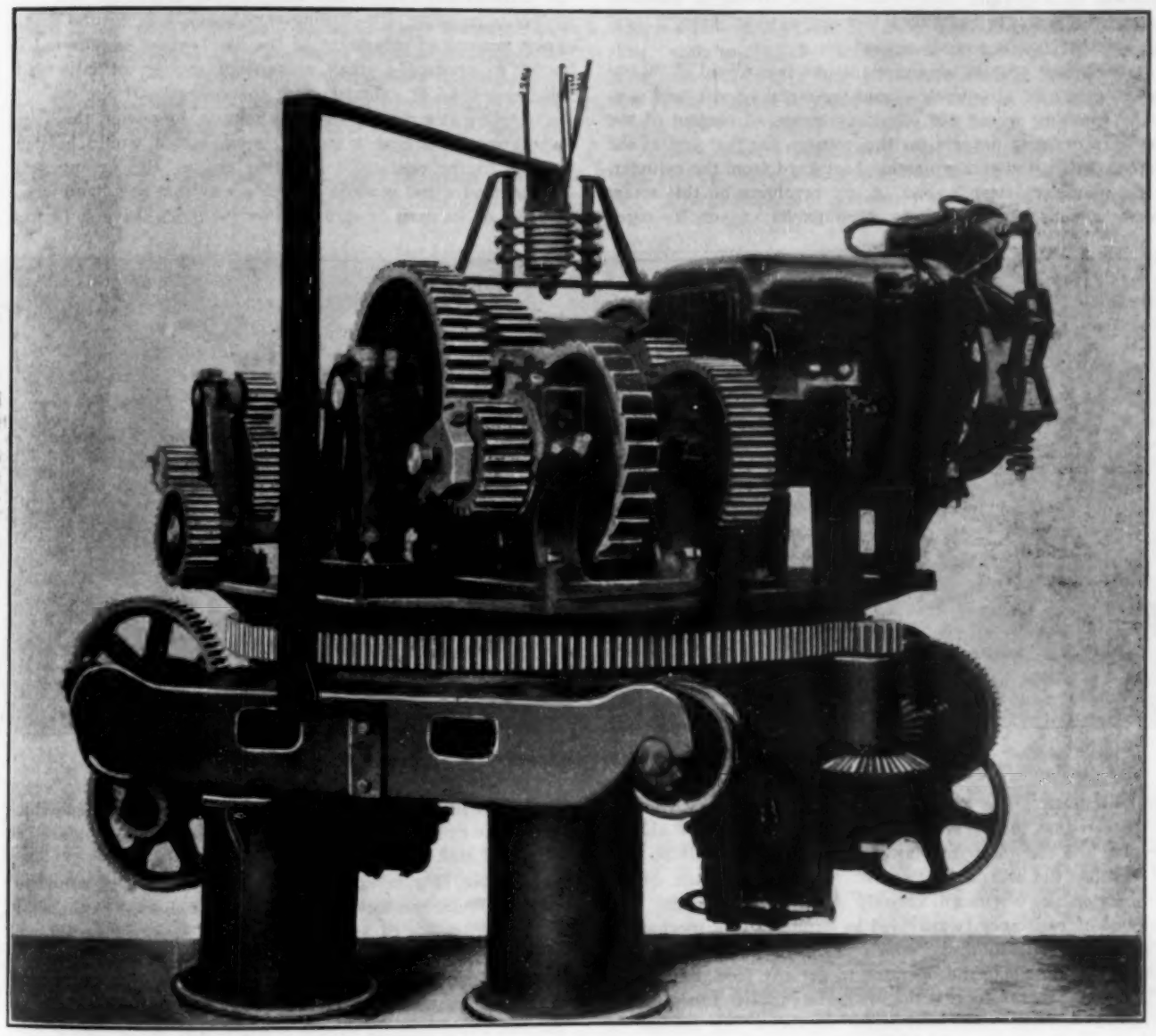
The Republic Iron & Steel Co. will start up another Pioneer stack at Thomas, Ala., at once, making two in operation.

The stack of the Clinton Iron & Steel Co., Pittsburg, Pa., was blown in this week.

REVOLVING INGOT CRANE.

In all large plants which are devoted to the extensive manufacture of limited lines of work, new forms of special apparatus are continually being brought out with a view to increasing the producing capacity by developing the equipment facilities to the highest degree. Especially is this true of the steel industry. One of the latest improvements for use in this field pertains to ingot handling and is here illustrated, being a revolving ingot handling crane, installed in the A. & P. Roberts Works of the American Bridge Co., by the Morgan Engineering Co., of Alliance, O. For its operation, which is entirely electrical, there are five Crocker-Wheeler K-type motors, each serving a distinct purpose. One of 45 h. p. drives the main hoist, one of 12 h. p. provides the trolley travel and one of 30 h. p. the bridge travel.

The bridge is of the usual type of construction common to traveling cranes, but the trolley, shown separately, is a radical departure. The base of the trolley is a circular casting in one piece with and connecting the side frames which form the trolley trucks. On it is supported the mechanism for traveling the trolley and revolving the hoist. The former is driven through three reductions of spur gearing from the motor, which is carried on the under side of the base, the opposite end of the motor being provided with a friction band brake controlled by a solenoid. The revolving mechanism is shown at the base. Through two trains of spur and one of bevel gears the motor is connected to a pinion which meshes with a spur gear band about the base of the turret. This motor, like all the others, also has a solenoid brake. The hoist is supported on steel balls rolling in grooves on the upper and lower members, so that it may be easily revolved to any desired position to allow the tongs, which are suspended from the hoist, to grasp an ingot at whatever angle it may happen to stand. The main hoist motor is mounted aboveboard in a compact manner and transmits power to the hoist through two reductions of spur gearing. In addition to the solenoid brake it has a mechanical load brake, which automatically prevents the load from descending unless the motor is revolved in the lowering direction. By this arrangement all strain due to load is taken from the motor and the gears between the motor and the mechanical brake, except in the act of hoisting. The pawls working in the ratchet of this brake are held out of contact during hoisting and are therefore noiseless. The auxiliary hoist drive has the drum mounted below the main hoist, well down within the center of the turret. This hoist is used for manipulating the tongs and is driven through three reductions of spur gears from a motor, mounted on the top of the turret.



MORGAN ENGINEERING CO.'S INGOT CRANE WITH CROCKER-WHEELER MOTORS.

The electrical connections to the bridge and the trolley are made in the usual way through shoes sliding on bare copper trolley wires, and the connection to the hoist motor through the slip rings and brushes mounted overhead. All the movements of the crane and the manipulation of the trolley hoist are directed through controllers of the Crocker-Wheeler make, contained in the operator's cage, making it equally as manageable with the same amount of attendance as an ordinary traveling crane.

Ryerson D. Gates and Henry L. Wilson have been appointed receivers in bankruptcy of the plant and assets of the American Malleable Iron Co., of Chicago Highlands, near Barrington, Ill. Creditors representing claims aggregating $2,055 petitioned the court for this action to be taken.

14-INCH NILES HYDRAULIC BORING LATHE.

The machine illustrated herewith is intended to bore gun forgings, marine shafts and ingots generally, and was built for the Midvale Steel Co., by the Niles-Bement-Pond Co., at the Niles Tool Works, Hamilton, O. It will take in a shaft 60 feet long, 30 inches in diameter, and bore a hole out of the solid 12 inches in diameter the full length, or 14 inches diameter for short lengths.

Two boring bars are used, one at each end, while the work is being held in a hollow spindle or revolving chuck. Two revolving ring steady rests on each side of the center chuck support the work. The feed pressure required to do such extremely heavy work is so great that it becomes impractical to feed by rack and pinion or screws. For this reason the boring bars are fed in by hydraulic pressure. The boring bar itself is clamped in a head by means of hydraulic pressure, in addition to lever and toggle joint. The hydraulic pressure against the piston is 720 pounds per square inch, giving a total pressure of 200,000 pounds against the piston.

It is obvious that an arrangement like this would allow the tool to gouge into the work should the metal be soft, and generally speaking would not offer any means of control of the feed. In order to provide for this control, the rear end of the piston, that is, the end projecting backward from the cylinder, is cut as a very steep screw. A nut revolving on this screw has a wormwheel (with very steep pitch) cut on its outer circumference. The angles of the screw and the worm are so chosen that the pressure against the piston will be able to revolve the nut, and the movement of the nut will be able to revolve the worm, but a relatively small amount of resistance on the worm will entirely check this movement. This amount of resistance is provided by ordinary feed mechanism taken from friction discs, which have the necessary change gears, etc., to enable the operator to get any feed desired. It will be seen, therefore, that the hydraulic cylinder furnishes the pressure and the feed mechanism furnishes the amount of feed, but that the feed mechanism is never subjected to the heavy strains due to the exceedingly heavy work to be done on this machine.

The illustrations clearly show the drive of this machine. It is driven by a 100-h. p. Westinghouse motor, operating at 220 volts. A motor of this make and size always allows of some speed variation by means of field control. The range of speed is increased by change gears, which are also closely visible in the illustration.

The main driving gear, which is bolted on to the hollow spindle or chuck, has 75 teeth, 4 inches pitch and 10 inches face. It is a steel casting, as is also the spindle.

The piece to be bored is chucked by means of the setscrews shown. There are eight setscrews, 3½ inches in diameter, on each side of the machine.

The feed is taken from the last driving shaft, and is transmitted to the two cylinders by means of the long shaft running alongside and in front of the bed. This shaft is supported by drop bearings and is made in three pieces coupled together. Change gears and friction discs give a wide range of feeds.

A hand feed is provided for by means of hand wheel. Before using this hand wheel, friction discs and feed driving-shaft are disconnected by means of a hand wheel. A 5-h. p. motor gives a fast motion to a train of gearing, whereas the feed mechanism gives a slow motion to this train. A clutch lever throws in either one or the other, and thus gives either a slow feed or a quick traverse of 10 feet per minute to the piston, and, if the cylinder is clamped to the bed, also to the clamping head, or, if the clamping head is clamped to the bed, it gives this quick traverse to the cylinder. This quick traverse is really gotten by means of hydraulic pressure in the cylinder, and the small motor only regulates the speed. A hand wheel gives adjustment to the piston and clamping head, or to the cylinder should this latter be clamped to the bed.

The parts to be moved being very heavy, it is natural that a great amount of movement of the hand wheel is required in order to produce a small amount of motion of either the clamping head or cylinder, and, consequently, if the cylinder is traveling at a rate of 10 feet a minute, by power, this hand wheel would race at a terrific speed, which would be dangerous to the operator. For this reason, the arrangement of the hand wheel is made in such a way that this hand wheel is loose on its shaft or stud if either the quick traverse or feed is thrown in, and is only connected to the mechanism which moves the cylinder when both feed and quick traverse are out of action, thus avoiding all possibilities of danger.

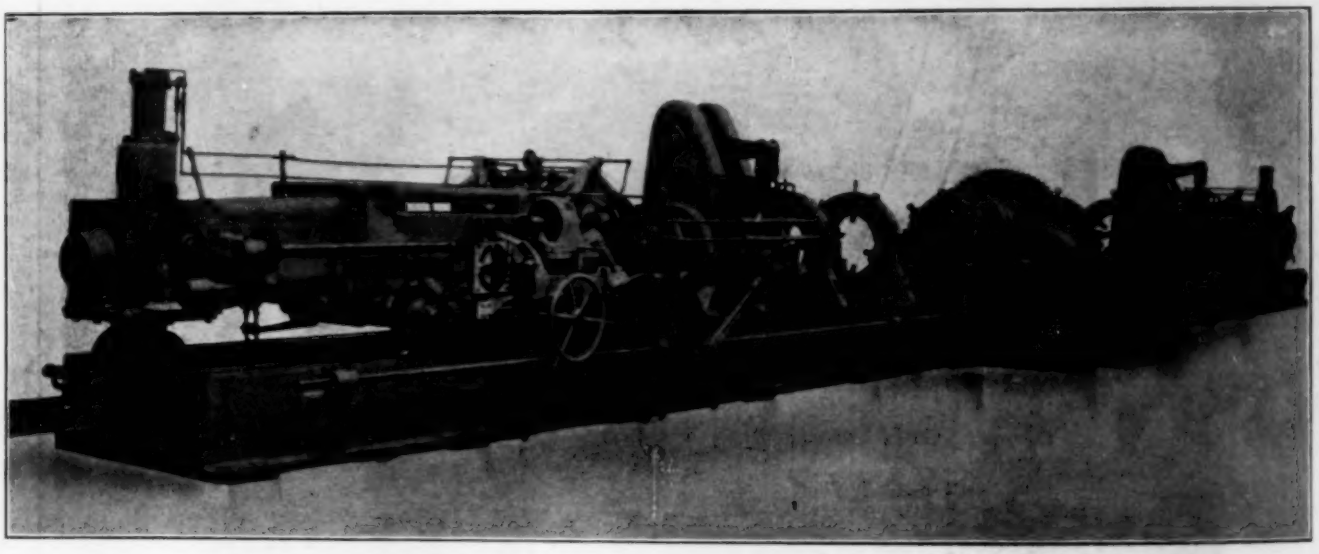


FIG. 1.—14-INCH NILES BORING MACHINE WITH HYDRAULIC FEED.

The train of gearing moved by the motor can be connected to the cylinder mechanism, or it can be connected to the shaft, which, by means of suitable gearing, drives a grooved roll, which is not visible in the illustration, but which is held in a floating frame inside of the rear part of the cylinder casting. This floating frame carries the hydraulic cylinder, the piston of which is connected to this grooved roll, while the cylinder casting is connected to two other rollers under the bar. By admitting water in this cylinder the inner boring bar is clamped between the rollers, and by moving the grooved roll a quick traverse motion is imparted to this inner bar.

The mode of operating this machine is to force 4 feet of the boring bar into the work. By that time the clamping head is up to the work and 4 feet distant from the cylinder. The quick traverse is then brought into play and the clamping head is pulled back until it comes up to the cylinder. The inner boring bar is then pushed 4 feet further forward and the boring bar is once more forced into the work another 4 feet. This alternate action of forcing the bar into the work and drawing the clamping head back so as to take a new grip is repeated until the center of the work is reached.

Before setting up new work, whereby, of course, the position of the clamping head and cylinder may have to be relocated, the following mode of operation is adopted: Supposing the

cylinder and clamping head are near the center of machine and are wanted at the extreme end of the machine; then first clamp the clamping head to the bed and by means of the quick traverse push the cylinder back 4 feet; then clamp the cylinder to the bed, unclamp the clamping head, and run it back 4 feet. Repeat this cycle of operation as many times as necessary. The inner boring bar can, of course, be withdrawn in one operation.

The piping for the different cylinders is at the rear of the machine, supported in brackets or rollers where the piping is sliding. There are handles for operating the various valves both on the front and rear sides of the machine.

Employes' Plan to Operate a Rolling Mill.

The following is the basis of the proposal made to the Republic Iron & Steel Co. by old employes of the idle Atlantic rolling mill at New Castle, Pa.: The men ask a lease on the works for which they propose to pay 6 percent on $50,000, or $3,000 a year, and in addition $2,000 to cover insurance and taxes. The employes are planning to organize a co-operative company, the stockholders agreeing to allow a certain percentage of their wages to remain in their treasury. Dividends, they figure, will more than offset this. For the first few months they ask the Republic Iron & Steel Co. to advance funds, on which interest will be paid, and for which a portion of the output can be held as security. The New Castle plant consists of 31 puddle furnaces, a two-high set of muck rolls, two skelp mills, one guide mill. It is proposed to start with about 25 furnaces operating single turn. The plant was recently improved, the puddle furnaces having been practically rebuilt. It is also possible that the skelp mills will be changed into bar mills or sheet mills, the same housings being used in either case.

J. E. Fell, who has had long experience in the mechanical department of the American Locomotive Works, at Schenectady, N. Y., has purchased the Gates Curtis foundry and machine shops at Ogdensburg, N. Y. This business was founded by Gates Curtis nearly forty years ago, and has had a very successful history. Mr. Curtis has decided to retire on account of broken health.

From the recent call for 20 percent of the cash stock subscription of $15,000,000, and the $5,000,000 of stock held in cash reserve, it is expected that the Lackawanna Steel Co. will receive in cash about $3,100,000, which will be spent in completing its plant. May 1 is fixed as the date when the company will begin making steel plates and structural steel.

The Virginia, Iron, Coal & Coke Co.'s furnaces at Middlesboro, Ky., have been banked and will be out of operation for 90 days.

CHICAGO RAILWAY EQUIPMENT CO.

E. B. Leigh, vice president and general manager of the Chicago Railway Equipment Co., in his report to the stockholders, just issued, makes statements which indicate that the company may centralize its business at Detroit. He says:

"In 1902 the Chicago Railway Equipment Co. purchased the brake beam business of the Monarch Brake Beam Co., of Detroit, and the Sterlingworth Supply Co., of Easton, Pa. Shortly afterward a tract of land was purchased at Detroit and a brakebeam shop 197 x 60 feet was built and put in operation Jan. 1, 1903. During 1903 additional buildings 143 x 60 feet and 404 x 80 feet were erected and are now complete. The plant is of brick and well adapted for the purposes designed and used. The total area of the property owned is 159,126 square feet, and the buildings now on it occupy 54,900 square feet. It will be noticed that the company has 330 x 132 feet north and 132 x 132 feet south, not yet built upon. The square portion facing the river has been reserved for suitable office buildings should the company at any time decide to centralize its business at that point. The company also has over a mile of standard gauge switch tracks, and nearly 2 miles of narrow gauge material tracks."

In another portion of the report Mr. Leigh says:

"A most efficient power plant has been established at Detroit, and the work is done in a thorough and economical manner. A large amount of machinery adapted for the purposes of the new factory has been brought from the Jersey City works, where it is no longer needed. It is the policy of the company to still more broaden and diversify its business and to get nearer to a manufacturing basis. It is believed the nearer this is approached the more stable the organization will become."

The balance sheet of the company shows that the capital stock authorized is $2,500,000, of which $71,250 is still in the treasury. In addition to this there are outstanding $260,000 in bonds. In addition to paying the fixed charges in 1903 the company paid dividends amounting to 7 percent on $2,428,750, the amount of capital stock issued. In conclusion the report gives a list of 172 patents controlled by the company, many of which were furnished by T. H. Simpson, vice president and general manager of the Michigan Malleable Iron Works and a heavy stockholder in the equipment company, William A. Pungs, and one or two others. The company has plants at Chicago, Jersey City and Detroit, one at Walkerville, Ont., and one at Montreal.

Frau Krupp observed the birthday of her late husband at Berlin, Feb. 17, by giving $25 each to 2,000 workmen who had been twenty-five years in the service of the company, and by donating $125,000 to the workmen's hospital.

The American Tool Works Co., Cincinnati, O., has received a large order for machinery from St. Petersburg, Russia.

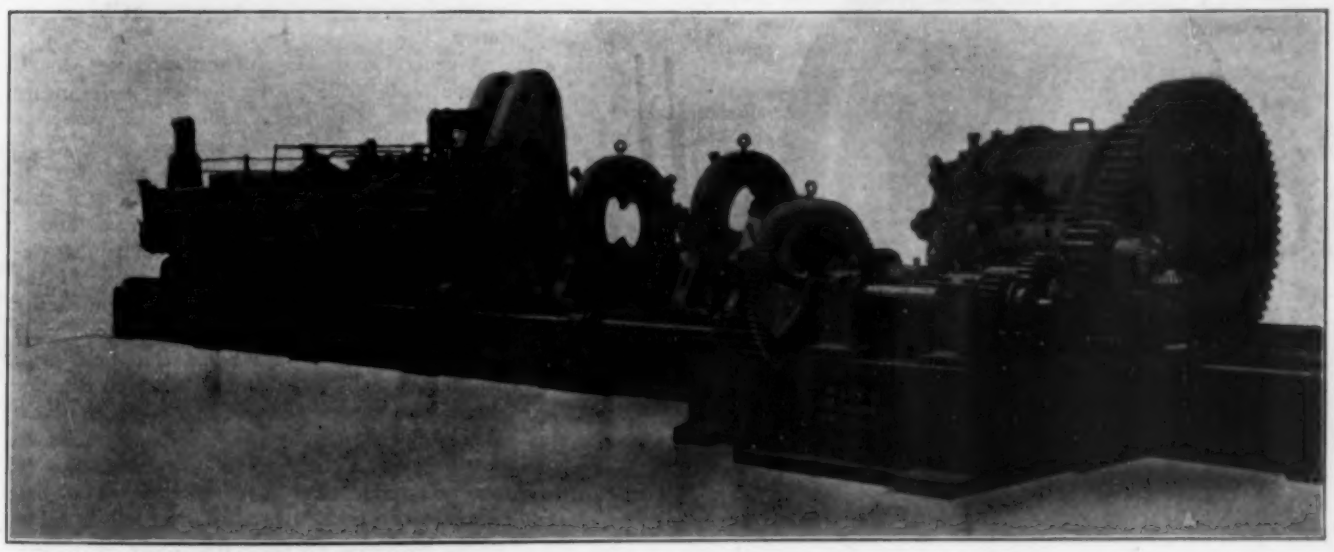


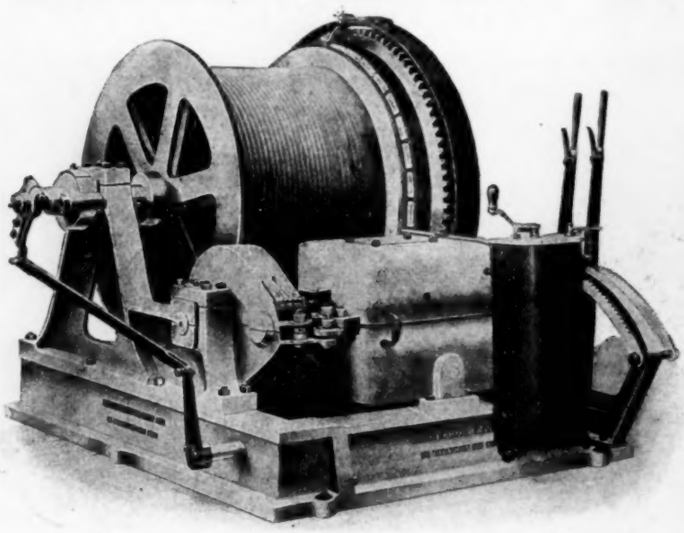
FIG. 2.—ANOTHER VIEW OF NILES BORING MACHINE.

LIDGERWOOD DIRECT CURRENT MINING HOIST.

The electric hoist illustrated shows the latest pattern direct current electric mining hoist built by the Lidgerwood Mfg. Co., of New York. This hoist is designed for use with a direct current of 500 or 250 volts and embodies in its construction the various features characteristic of Lidgerwood hoists. There is the usual workmanlike simplicity of design with few parts and compact construction, giving great strength and insuring high efficiency in service.

The drum motor and controller are mounted complete on a bedplate. The resistance boxes are commonly separate from the hoist and conveniently located so that the heat generated may not be annoying to the operator. In smaller sizes it is sometimes desired to have the machine completely self-contained and portable, in which case the resistance is of special form and attached to the inside of the bedplate. The friction drum is of the standard Lidgerwood type with all the latest patented improvements.

The motor is made by the General Electric Co., is of armored type and especially adapted for hoisting purposes. All moving parts are protected from dust and moisture by suitable casing and the gearing from the motor to intermediate shaft is cut, and enclosed in an oiltight gear case. The drum gearing is cast from standard patterns and protected by means of the usual guard band. The railway type



LIDGERWOOD ELECTRIC HOIST FOR MINES.

controller is provided with a reversing switch, and mounted conveniently for the operator.

The friction and brake levers are mounted in a rack with notched quadrants and are fitted with thumb latches. A large number of these electric mining hoists have been built and they are giving complete satisfaction.

The stockholders of the American Screw Co. held their 44th annual meeting at Providence, R. I., a few days ago and listened to very satisfactory reports submitted by the president and board of directors. The following were named as directors for the ensuing year: Charles B. Humphrey, Charles Alexander, George L. Shepley, George H. Robinson, Marsden J. Perry, Arthur H. Watson and Samuel M. Nicholson. At a subsequent meeting of the board, the following officers were elected: Samuel M. Nicholson, president; Marsden J. Perry, vice president; George W. Thurston, treasurer; William A. Cranston, secretary; Benjamin Thurston, general superintendent; and James A. Ngaley, agent.

A cablegram from Glasgow announces that at a private meeting of the Scotch steel-makers, held Feb. 16, an agreement for regulating prices was concluded. It is stated that all the makers in Scotland joined. The meeting agreed to raise the prices of boiler plates 5 shillings per ton, ship plates 2 shillings and 6 pence, and iron bars 2 shillings and 6 pence.

The Small Mill Plant vs. the Large Mill Plant.

BY D. F. NISBET.

Some time since, in a conversation with the manager of a rolling mill regarding the reconstruction and modernization of old plants, he made the remark that their mill was "an old one and only a small affair at that, and it would not pay to put in a modern mill." Their mill, although a small one, consisting of one 18-inch mill, one 10-inch mill, and one 8-inch mill, all of a somewhat ancient type, was kept in excellent condition as to repairs and general neatness, showing that it was under constant and intelligent supervision, and also indicating that in the operation of the mill a close surveillance was exercised in keeping it at the highest efficiency as to earning power that a mill of its class was capable of.

Knowing that the well designed modern mill, equipped with operating tables and other necessary mechanical appliances, and provided with a steam generating plant of ample capacity and designed for economical working, modern automatic engines generously proportioned for the work, heating furnaces of the regenerative or continuous type, etc., possesses so many more opportunities for the practice of economies than can be found in mills of the olden type—of which the mill mentioned above is an example, and of which type there are still many in existence—it occurred to the writer that a presentation of some of the more important points in a comparative form might be of interest.

A general comparison of mill practices would, of course, be tentative in character only, owing to the fact that every rolling mill possesses characteristics which are inherent, but which must be taken into consideration when any attempt is made to criticise the practice of that particular mill under a given set of conditions. There are, however, some of the component elements of mill construction and some of the usages of mill practice, which are practically common to all mills, and these can be compared as to their relative values and efficiencies with advantage. It is proposed, therefore, to examine some of these elements and usages which obtain generally, as to their values and efficiencies, as found by actual experience in the operation of the mills which are to be taken as examples. The old mill previously mentioned will be taken as an exemplar of one type, using the actual conditions and practice of this mill, so far as it is of record, as data for this type, and compare with it the analagous conditions and practices that are known to obtain in a mill of modern design.

Elements to be Compared.

The elements and usages that are to be analyzed and compared are the boilers and engines, the heating furnaces, and the practice at the rolls in the matter of crop ends. There are, of course, many points other than those mentioned, that are deserving of consideration; but as the present object is a comparison of types from the viewpoint of their investment values, rather than a discourse on the didactics of economy, they will not be noticed at this time.

In order that the basis for the comparisons may appear equable, it will be assumed that the two mills are rolling similar sections of ¼ inch x 8 inch tin bars, and each is producing 90 gross tons per 24 hours. The comparison extends to but one mill in each plant, the 18-incn in the old mill and an 18-inch modern mill; each being assumed to be complete, fully equipped plants, comprising the boilers, engines, heating furnaces and all necessary appurtenances.

The mill equipment of the old plant consists of a roll train of three stands of rolls, without tables or other mechanical devices for the handling of material, the blooms being run from the furnaces by means of the ordinary "telegraph" and handled at the rolls with "hook-ups." The boilers are of the two-flue type, in poorly designed settings; the engine is of the ordinary slide-valve class regulated by a throttling governor; and the heating furnaces are all of the direct-fired type.

At the time this mill was built "hand mills" were the rule, and because of the limitation imposed by hand working, the weight of the bloom that could be handled was restricted, and as a consequence the length of bar that could be rolled was limited. In the old mill we now have under observation the longest bar that could be rolled was 30 ft.

The number of men employed on the mill proper, between the furnaces and shears, on each turn, not including the engines, millwrights, greasers, etc., is 15, or 30 men all told on both turns. Their average wages for the month of November, 1903, aggregated $165.40 per day. The proportion of the total capitalization of the entire plant that would be assigned to the 18-inch mill, assuming it to be a complete installation as heretofore noted, would be about $200,000.

The modern mill with which comparison is to be made consists of an 18-inch mill equipped with operating tables and other mechanical appliances, of such design as will permit of rolling a bar of the section assumed to a length of 90 ft.

The boilers are of the water tube type, stoker fired, and provided with fuel economizers; the engines are of the automatic type, and of ample power; and the heating furnaces are of the regenerative class, and provided with a well designed gas producer plant. The number of men employed on this mill for both turns, between the furnaces and shears, not including engineers, millwrights, greasers, etc., is 22, the average wages of whom aggregate $142.20 per day. The proportion of the capital of the whole plant, that is fairly assignable to this mill, considering it, as in the case of the old mill, a complete, fully equipped plant, would be $300,000.

Comparison of Steam Plants.

The element which first presents itself for observation and comparison, is the steam generating plant.

In the old mill which is being taken as an example, the boiler plant for the 18-inch mill is an isolated one, furnishing steam for this mill alone, and therefore the data applied to this mill are, in so far as the practice at the boilers is concerned, conservatively estimated from the records of their actual performance. These boilers, as has been heretofore mentioned, are of the long, two-flue type, and, from the viewpoint of present practice, are very poorly set. It is not the intention, however, to criticise either the boilers or the method of setting, as doubtless, when they were installed, this type of boiler and method of setting were considered as being in keeping with good practice. But we can, with impunity, criticise the results that are now obtained from such intallations, because of the fact that they are still retained in use when it is known that they are so very wasteful and inefficient, and the same criticism will also apply to the use of the slide-valve, throttling engine now installed in this mill.

The average horsepower developed by the ordinary rolling mill engine, day by day, is exceedingly difficult of accurate determination; but according to the best data obtainable, the engine in the old mill develops about 400 h. p., and in producing this power uses an average of 55 pounds of steam per horsepower per hour, or for the 400 h. p. 22,000 pounds of steam per hour will be required. The boiler furnishing the steam for this engine has been found to have an evaporative capacity ranging from 5.2 to 6 pounds of water per pound of bituminous slack coal. On this basis, then, there would be required for steam generating purposes per 24 hours $\frac{22000 \times 24}{6 \times 2000} = 44$ net tons of coal, which at a price of $2 per net ton would make a daily cost of $88 for fuel and per year of 300 working days, $26,400. (The amount of coal actually used at this plant during the month of November, 1903, was 1,329+ tons; and if this amount be assumed as the monthly average, the yearly cost for coal would be $31,896.)

This boiler plant is nominally of about 500 h. p. and cost in complete running order about $11,500.

In the modern plant, the power required to drive the mill and accessories will perhaps average 600 h. p. These engines—assuming that the tables and other appurtenances are driven through electric motors and generators by means of a high class engine—will develop a horsepower with an average expenditure of 32 pounds of steam per horsepower per hour, and would, therefore, require $600 \times 32 = 19{,}200$ pounds of steam per hour, while with any good type of water tube boiler properly installed, an evaporation of 7.5 pounds of water per pound of bituminous slack coal can be realized easily in every day running, and with the fuel economizer attached, a saving of at least 10 percent of the fuel can be accomplished We would require, then, with this installation $\frac{19200 \times 24}{75 \times 2000} \times 90 = 27.65$ net tons per 24 hours, which at $2 per ton would cost $55.30, and the cost per year of 300 working days would be $16,590.00.

This boiler plant, without the economizers, would cost in complete running order, about $16,800; and the economizers for this power erected and connected ready for operation, would cost about $5,400, making a total cost of $22,200 or $10,700 more than the cost of the boiler plant at the old mill. But this combination of boiler, engine and economizer will show a saving of $9,810 per year as compared with the combination of boiler and engine in the old plant, and this is a 91 percent return on the difference in the costs of the two plants. But as a part of this saving is due to the higher type of engine used in the modern mill, the costs of the entire combination should be taken rather than the costs of the boiler elements alone. In the modern mill, moreover, there is the engine which is used for driving the generator for operating the tables and other labor saving appliances; and as these in turn displace men, it will be very difficult to differentiate as to an equitable distribution of the proper credits for the savings effected.

Without the economizer, the combination of boiler and engine in the modern mill would consume 30.72 tons of coal per day at a cost of $61.44, and a cost per year of $18,432; and for the purpose of showing the value of the economizer as an investment, the following cursory exhibit is made:

Investment in economizer		$ 5,400
Interest, taxes, depreciation and repairs 17 percent	$ 918.00	
Cost of fuel per year		$18,432
10 percent of cost of fuel	$1,843.20	
Deducting the fixed charges	$ 918.00	
Net saving per year	$ 925.20	

which represents a 17.13 percent return on the investment of $5,400 in the economizer.

Aside from being of value as an investment, the economizer is a particularly valuable adjunct to the boiler plant of the rolling mill because of its capacity for the storage of a large volume of water, at or very near to the boiling point for the pressure of steam carried; so that when, as is frequently the case in rolling mill service, a sudden demand is made for a large volume of steam, this reserve capacity permits the boiler to fill the demand at once.

A False Economy.

It may be pertinent to ask why so little consideration is usually given to the economical generation of steam, even in some of the most modern steel works and rolling mills. It is certain that the conditions of service to which the rolling mill engine is subjected and not conducive to the economical use of steam; and there is absolutely no valid reason why the steam generating plant for rolling mills should not be so designed and so conducted as to show as economical results as can be obtained in the boiler plants of any other class of manufacturing. And it would also be of interest to know by what process of reasoning some mill designers and managers find that there is some measure of economy in installing an inadequate boiler plant, and then, by forcing it to the limit, attempt to get the required capacity from it?

Attention might also be given to the incongruous conditions that exist in some mills, in which high-class, compound condensing engines have been installed for driving the rolls, while the steam generating plants of these same mills are almost ridiculously inefficient and uneconomical. Such installations appear to be attempts to save money after having spent it.

Little further need be said regarding the engines used in our typical mills, as, for present purposes, being so intimately connected with the boiler problem, they have been considered with them. It has been shown that the automatic engine properly proportioned for its work is the more economical; it is only fair to say, however, that had the slide-valve engine also been well proportioned for the work it is doing, it would have made a much better showing.

In regard to the use of the compound engine for rolling mill service, if there is a sufficient water supply, so that it may be run condensing, and the work for the engine is fairly continuous, it will probably show a saving commensurate with the increased cost of the installation; but if the work for the engine is very variable as to power required, or is very intermittent as to times of load, as is often the case in rolling mill service, the compound engine is believed to be a somewhat dubious investment.

The Heating Furnace.

The heating furnace practice, as exemplified in the operation of the old mill, where the direct-fired type of furnace is used, is a proline cause of wastes. This type of furnace, as commonly operated, necessitates a consumption of from 500 to 700 pounds of coal per gross ton of blooms or billets heated. This extravagant use of fuel is partly due to the fact that an enormous amount of the heat generated in the fire box, passes to the stack without doing useful work, and partly for the reason, that in order to maintain the requisite high temperature in heating chamber of the furnace, the fire is worked at frequent intervals, with the result that a large proportion of the fuel is deposited in the ash pit in an unburned state; this waste alone, in instances within the writer's knowledge, has amounted to 33 percent of total fuel charged.

For heating the 90 tons of finished bars per day, which are produced by our mill, assuming an average consumption of 600 pounds of coal per ton of material heated, we would have for the daily consumption $\frac{90 \times 600}{2000} = 27$ net tons, which at $2 per ton would make a daily cost of $54 for fuel and a yearly cost for 300 working days of $16,200.

The amount invested in these furnaces and appurtenances is approximately $18,000; and if we assume the fixed charges for interest, taxes, depreciation and repairs to be 20 percent we will have as the yearly cost of type of furnace, as follows:

Fixed charges	$ 3,600
Yearly cost of fuel	16,200
Total yearly cost	$19,800

The installation of the regenerative system of furnaces with the necessary gas producer plant, would require an outlay of approximately double the amount invested in the direct-fired type, or $36,000, and assuming the average amount of coal required for heating a ton of material in this type of furnace to be 300 pounds, we would have as the yearly cost for fuel $2 multiplied by $\frac{90 \times 300 \times 300}{2000} = \$8,100$, and assuming the fixed charges at 20 percent, as before, we would have as the yearly cost of this system:

Fixed charges	$ 7,200
Yearly cost of fuel	8,100
Total yearly cost	$15,300

showing a net saving of $19,800 — $15,300 = $4,500, which represents a 25 percent return on the increase of cost due to the adoption of the regenerative system of furnaces.

For the particular work we are now considering, the continuous type of furnace would show a still greater economy, as with this type of furnace a coal consumption of from 200 to 250 pounds per ton of material heated is all that is required, and as the cost of continuous furnaces for equal tonnages would be no more than the regenerative type, we would have for the yearly cost, assuming an average of 225 pounds of coal per ton heated, $\frac{90 \times 225 \times 300 \times \$2}{2000} = \$6,075$, and adding to this the fixed charges at 20 percent as before, we would have as the total yearly cost $13,275, showing a yearly saving of $6,525 as compared with the direct-fired furnace, making a 34 percent return on the difference in the cost of the two types. But while this type of furnace is especially well adapted to heat the material we are now supposed to be using, it is not very desirable where a greatly diversified product is to be made, nor is it suitable for iron.

The Item of Long and Short Bars.

The losses that accrue in old mills because of their inability to roll longer bars is a very considerable one, and may often be of such importance as to be the deciding factor in the question of dividends.

In the old mill which we are using as an example, as has been mentioned, 30-ft. bars only can be rolled on account of its being a "hand mill," and because of the limited "standings" which prevent a longer runout. The bar is 30 ft. long and the section ¼ in. x 8 in., weighing 6.8 pounds per foot, or 204 pounds per sheared length of 30 ft. The crop ends at this mill average one foot on each end, or two feet per bar, making a wastage on each bar of 13.6 pounds.

As this mill produces 90 gross tons or 201,600 pounds per 24 hours it would be necessary in accomplishing this output to roll 988 bars, from which the crop ends would aggregate 13,436 pounds, or in round numbers, 6 gross tons per day. We would have, then, for the production of this mill per year, 27,000 tons of finished bars and 1,800 tons of scrap in the form of crop ends, making a total output of 28,800 tons. assuming the market price of the finished bar to be $30 per ton, and the price of scrap of this class to be $10.50, we would have the yearly income of this mill:

27,000 tons of finished bars at $30	$810,000
1,800 tons of scrap at $10.50	18,900
Making the total income	$828,900

for rolling 28,800 tons of material, which shows an average price for all material rolled, of $82.78 per ton.

The modern mill with which comparison is to be made is equipped with operating tables and such other paraphernalia as is necessary to permit the rolling of 90-ft. lengths of finished bars, with a minimum amount of manual exertion. These bars will weigh 612 pounds each, and to achieve the required tonnage 329 bars must be rolled in 24 hours, from which—assuming the crop ends to be of the same length as those from the 30-ft. bars—the loss in scrap would be 4,475 pounds, or approximately two gross tons per 24 hours.

The yearly production of this mill, then, would be 27,000 tons of finished bars and 600 tons of scrap, or a total of 27,600 tons, and the yearly income—assuming the same prices as for the old mill—

27,000 tons of finished bars at $30.00	$810,000
600 tons of scrap at $10.50	6,300
Making a total income of	$816,300

for rolling 27,600 tons of material, or an average price of $29.57 per ton rolled, showing that this mill receives an average of 79c more per ton than the old mill.

The value of this scrap, on the books of the company, is precisely the same as the value of the finished bars, in so far as costs are involved; and assuming the selling prices given as a basis, we have in the one case, a mill making 1,800 tons of scrap per annum that is worth $30 per ton, which will be sold at a price of $10.50 per ton, making a direct loss of $19.50 per ton, and a yearly loss of $35,100.

In the other case, we have a mill making but 600 tons of scrap, on which the yearly loss at $19.50 per ton, will only be $11,700 or $23,400 per year less than the loss from this source in the old mill. The loss suffered by the old mill from this cause, may be shown more concisely by putting the matter in the following form.

To produce 27,000 tons of marketable product, the old mill will use 28,800 tons of material in the form of blooms; while the modern mill, to produce the same tonnage of salable material uses but 27,600 tons of blooms, or 1,200 tons per year less than the old mill. The excess of material, bought in the market in the form of blooms, would cost—assuming a price of $23 per ton—$27,600, to which is added a further cost of $7 per ton, to cover handling, heating, rolling, profits, etc., making an additional yearly cost of $8,400 on this tonnage, a total of $36,000. This tonnage is then sold at $10.50 per ton, making a credit of $12,600, showing, as before, a net loss of $23,400.

Perhaps a fairer comparison of the mill practices relative to this feature would be to assume that the modern mill was rolling the same gross weight of blooms per year as the old mill, in which case we would have as before the old mill using 28,800 tons of material to produce 27,000 tons of finished bars and 1,800 tons of scrap, from which is derived a total yearly income of $828,900.

The modern mill, using the same gross weight of blooms,

viz., 28,800 tons, would produce from this, 28,170 tons of salable product, having market value of $845,100, and 630 tons of scrap which could be sold for $6,615, making a total yearly income for the mill of $851,715, showing an earning capacity of $22,815 per annum more than the old mill, from the same gross weight of material used. If we were to capitalize this saving, assuming, say, 22 percent to cover interest, taxes, depreciation, repairs and profit, it would warrant the investment of $103,700 to accomplish this result alone.

Number of Men Employed.

There are many other features embodied in the design of the modern mill whereby augmented economies are made possible, but as they are not easily comparable with analogous features in the old mills, no attempt will be made to consider them at this time. There is one item, however, that has been mentioned, which may be noticed briefly, concerning the number of men employed on each of the typical mills.

The daily aggregate of wages of the men employed on the old mill, on the mill proper, was, as has been stated, $165.40; while the wages on modern mill for simiar positions is but $142.20, showing a saving in wages due to the mechanical features of this mill, of $23.20 per day, or a yearly saving of $6,960. This saving, if capitalized at the rate of 22 percent as before, would justify the investment of $31,636, which if added to the amount which has been shown as warranted by reason of the capability of the modern mill to roll the longer bars, would make a total of $135,336 which would be the amount we would be justified in spending on the mill alone, over and above the cost of a mill of the old type, to realize these savings; and which amount is nearly double the actual difference in the costs of the mills. It may be of interest to capitalize the various savings effected by reason of the adoption of a modern mill, in which are embodied the economical features mentioned.

Boilers and engines, per year	$ 9,810.00
Regenerative furnaces, per year	4,500.00
Mill ($22,815.00 + $6,960.00), per year	29,775.00
Total	$44,085.00

This amount if capitalized at the rate of 22 percent gives us $200,340 which is slightly more than double the difference in the capitals of the two companies.

Economies of Additional Investment.

It may be thought that the data adduced in connection with the old mill represents exaggerated conclusions based upon abnormal conditions, but it must be remembered that in this particular instance, as in nearly every other instance in old mills, the boilers and engines are forced far beyond their rated capacities, and the furnaces and roll trains are handicapped by peculiarities of design, to an extent that places the mills in disadvantageous positions. The statements of savings are, of course, only possibilities, and whether they are fully attained or not, will depend entirely on the management of the plant; the essential point is, that they are attainable, even in the small plant.

The matter of the displacement of men in the operation of a mill, by the use of automatic mechanical appliances leads to these questions: To what extent are we justified in increasing the cost of a mill, by the introduction of devices for this purpose? And, without considering the cost of a device, where should the limiting line be drawn, as to complications in a mechanism designed to perform some function automatically? In other words, when does a mechanism cease to be of legitimate design and approach the status of the freak?

It would be a difficult matter to locate the line of demarcation as to the justifiable expenditure definitely, but the writer believes it is approximated very closely, when the fixed charges covering interest, taxes, depreciation and repairs, on the amount that is required to build, install and operate the appliance or device that is designed to accomplish the desired object, equals or exceeds the cost in wages of the men it is presumed to displace. And when a machine is complicated to a degree that necessitates an augmentation of the repair force in order to keep it in operation, the limit, from the purely mechanical standpoint, has been exceeded.

As illustrating the limiting condition in regard to the extent we are justified in expending money for automatic machinery intended for displacing men in the operation of a mill, a recent design for a new mill with which the writer is familiar may be utilized.

This mill is intended to be the acme of mill engineering and is very elaborate in design. It is comprised of eleven stands of rolls, driven by three engines, and has about 700 feet of roller tables, together with many automatic appliances and devices, and will cost as a complete plant about $450,000. This mill will require the services, on the mill proper, not including engineers, millwrights, greasers, etc., of seven men on each turn, or four men less per turn than the typical modern mill, making eight men per day whose services will not be required because of the improved construction of the mill. Assuming that these men each earned $5 per turn we would have an apparent saving of $12,000 per annum.

The mill, as before stated, will cost $450,000, or $150,000 more than the modern mill we are using as an example. Now if the fixed charges on this excess are equal to or greater than the saving in wages effected, it would seem evident that the investment, from an economic point of view, is without justification.

We have assumed in some of the previous instances, an investment factor of 22 percent as covering the accounts of interest, taxes, profits, depreciation and repairs. If we apply this rate, we will find that an expenditure of $54,545 will simply balance the saving in wages; therefore, in investing $150,000 in machinery intended to save $12,000 in wages, the economic limitation has been exceeded, and incidentally showing that with equal tonnages the simpler and cheaper mill, even with more men employed upon it, is the better investment.

The mill in question has, of course, a productive capacity far greater than that which has been assumed for the typical modern mill, but the typical modern mill has a capacity fully equal to that of the mill under observation, the output of 90 tons per day having been arbitrarily assumed for the purpose of comparing the olden and the modern mills on even terms. Either of these modern mills could easily produce from 200 to 300 tons of this material per 24 hours.

Where Added Equipment is Not Economy.

As illustrating a case where the limiting conditions, as between a legitimate design and a freak machine were exceeded, an instance within the writer's recollection may be mentioned.

In a mill where 4 x 4 billets were made, the billets, after having been sheared, dropped on to a platform in a pit in front of the shear, and were raked off on to a buggy by two laborers stationed in the pit. Trouble was experienced in keeping men in this position, on account of the extreme heat, and the engineer of the plant, desiring to eliminate the difficulty at this point, devised an elaborate automatic appliance to do the work of these men mechanically. After the device had been in operation for some time, the writer, while in conversation with the superintendent of the plant, asked if they had been successful in dispensing with the manual labor in the pit, and was answered in a somewhat hesitating manner, "Yes, we have got rid of the laborers, but we have to keep two machinists there now to keep the thing in operation."

This instance, while no doubt somewhat exaggerated, clearly indicates the fact that the line of demarcation had been passed; but as this line is not easily discernible, no rule can be formulated for locating it, and it must always remain a matter for the exercise of judgment by the designer.

As may be surmised, the aim of this article is to disprove the inference contained in the remark of the mill manager, who was quoted at the commencement as saying that their mill was a small affair and that it would not pay them to put in modern appliances. The inference was that if a mill is small, the properly equipped modern mill would have no advantage over the old-time hand mill.

It is believed, and the effort has been made to show, that the size of the mill is not altogether the deciding factor, as there are relatively as many opportunities for the working out of economies in the practice of small mills as in the large mills. It is the belief of the writer that small mills, designed with the same regard for economical conditions as obtains in the

design of the large modern mill, will be in a much better position to withstand the fluctuations of the market than they now are, and in times of business depression, when the mills are not running to their full capacity, the small mill would have a clear advantage over the large mill, because of its relatively smaller fixed charges.

British Iron Masters and Protection.

At a meeting of the board of management of the British Iron Trade Association, held at London on Feb. 3, information was presented indicating that iron and steel manufacturers in the British Isles are seriously considering the need of such a change in the tariff policy of Great Britain as will protect them against cheap American and German steel. Some time ago the association's secretary sent out circular forms to its 200 members, the following questions being asked:

1. Are you of the opinion that the association should take steps to assist the Government in their proposed inquiries on tariff matters? 2. If so, have you any suggestions to make as to how this might most effectually be done? 3. Do you believe that a change of tariff policy would promote the best interests of the iron trade? 4. Would your own interests, as a firm, be likely to be promoted by the adoption of preferential tariffs. 5. Does your experience as a manufacturer (or merchant) lead you to believe that you would gain more than you would lose by preferential treatment of the colonies? 6. Do you think that a negotiating margin should be given to the Government in arranging treaties with foreign countries?

There were 63 replies. The secretary's report says: "Of that number, only four have signified a preference for having existing conditions continued, and more than 90 percent have signified their desire that some change in the present system should be made, while declining in the majority of cases to commit themselves to the precise character of such change. It may be supposed that this is too limited a number to pass any conclusions upon as to the general sentiment of the members of the association in relation to the subject at issue, but on comparing the figures just presented with those of corresponding returns made to commercial bodies, as, for example, to the London Chamber of Commerce, which has taken a vote of its members on the same question, I find that the percentage proportion that has responded to our circular letter is more than the average. If the expressions of opinion sent in to the association be accepted as an indication of the views of the iron and steel trades, generally, it would appear to be evident that there is a preponderating view in favor of some change of the existing conditions."

It was further stated by the secretary that a committee of Mr. Chamberlain's tariff commission had been appointed to deal with the iron and steel trades. The board of management decided that as there was no invitation from the Government or from the tariff commission to deal with the question, it should be held in abeyance.

An illustrated lecture was announced for the February reunion of the American Society of Mechanical Engineers. The lecture, for Feb. 23, was on "Modern Ordnance," by Major Rogers Birnie, Ordnance Board U. S. Army of the Sandy Hook Proving Grounds. The address treated generally of the growth and present condition of existing field and seacoast artillery in the United States, the uses to which the guns and their accessories are applied, together with discussion of some of the more important mechanical principles involved in their construction in connection with experiments, and was illustrated by a number of lantern slides.

President Stratton, of the Mobile, Jackson & Kansas City railroad, has placed an order for 16,500 tons of steel rails with the Tennessee Coal, Iron & Railroad Co., shipment to commence March 1. The rails are to be used in completing the extension between Decatur and Pontotoc, Miss. It is expected that 20,000 tons additional will soon be purchased. This railroad runs from Mobile to Bolivar, Tenn., and when the gap between Decatur, near Newton, Miss., is filled, there will be a direct line from the Illinois Central track at Bolivar to the Gulf.

ALLIS-CHALMERS CO.'S NEW LINES.

The Allis-Chalmers Co. makes formal announcement of its purpose to engage in new lines of manufacture, namely, steam turbines, hydraulic machinery, gas engines and electrical machinery. The details are thus given by the company:

"As regards steam turbines, we have become associated with and form part of the Steam Turbine Advisory Syndicate, of England, which is composed of: Yarrow Shipbuilding Co., of England; Tweedie (Vulcan) Shipbuilding Co., of England; Willans & Robinson, engineers and well known engine builders, of England; Mr. Fullager, formerly chief engineer of Parsons Steam Turbine Co., of England, now consulting engineer for Steam Turbine Advisory Syndicate; Allis-Chalmers Co. Our turbine is of the horizontal type, which is the type Parsons, of England, and Brown Boverie, of Switzerland, manufacture. We are now prepared to enter into the building of steam turbines of the following sizes: 500, 750, 1,000, 1,500 and 5,000-k. w., and can if required build up to units of 10,000 k. w. The largest size that has ever been built of any type of turbine is 5,000 k. w. Our license from the Advisory Turbine Syndicate concedes to us all of the United States, Canada and Mexico, with equal rights and privileges in South America, and rights to do business elsewhere in the Western Hemisphere.

We have concluded arrangements with Escher-Wyss & Co., of Zurich, Switzerland, whereby we become the sole licensees for the Western Hemisphere of their famous hydraulic machinery, several types of which have been installed at the Niagara Falls plant of the Cataract Construction Co., aggregating 85,000 h. p. We only mention Niagara Falls as one of the plants employing thousands of horsepower installed by Escher-Wyss & Co.

"We have bought the American Patents, and have become sole licensees for the Western Hemisphere, of the Nurnberg Machine Co., Nurnberg, Germany, for their gas engines, and are now prepared to make gas engines up to any required horsepower. At the present time we are prepared to build gas engines from 250 to 1,500 h. p. These engines are suitable for consumer gas or taking the waste gas from blast furnaces and utilizing same with economy and efficiency. It is in the blast furnace trade that we expect the largest business to result. The engine is not an experiment, but engines of 1,500 h. p. are now in operation in Germany, and it was after two years' investigation by our engineering staff of the various gas engines, that we selected the Nurnberg, and have engaged in its manufacture. It is a prime mover, either for blowing engines in blast furnaces, or for direct connected dynamos in generating electricity, or for any other purpose where power is required.

"We have engaged in the manufacture of generators, motors, and electrical apparatus in all its branches both for stationary and railroad work, power house installation for transportation purposes and electric lighting. We have engaged to take charge of this department of our business: John F. Kelley, formerly of the Stanley Electric Co., William Stanley, of the same company as consulting engineer, and John H. Kelman, formerly superintendent of the Stanley company as superintendent of this department. In addition we have engaged others of the late Stanley company's staff whose services we can use, and have drawn a further supply from the best electrical establishments in this country and in Europe."

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., advises us concerning the rumored establishment of a plant for the manufacture of electrical machinery to be used in connection with marine construction that the company has taken no action whatever that will justify the reports which recently appeared in the public press.

The American Car & Foundry Co. has received a contract from the Detroit water board for furnishing 396 tons of water pipe at $21.50 per ton. The board of public service at Toledo, O., has awarded a contract for 500 tons of pipe to the United States Cast Iron Pipe & Foundry Co., of Detroit, at $21.75 per ton.

A Decade in American Blast Furnace Practice.*

BY F. LOUIS GRAMMER, BALTIMORE, MD.

In order to appreciate the present condition of blast furnace practice, it is necessary before enumerating the advances made during the past decade to give a brief discussion of the tendencies in the methods of administration as well as the conditions governing supremacy, for these factors have modified the aims of the manager.

Nowadays, the administration at some plants is such that the superintendent has become a train-dispatcher or a burden-clerk; and this is particularly the case in those plants in which the engineering duties have been divorced from the executive functions of the superintendent, and where the preparation of ores is made at the mine rather than at the plant. At such plants, usually consisting of four or more units, the proper feeding of the furnaces with a mixture, which the past has demonstrated will not make it ill, has become one of the superintendent's primary duties. The traffic management also is important and at several plants, running from 3,000 to 14,000 tons of raw material daily, excluding metal made, is equal in tonnage to that of many railroads. In addition to the traffic consideration, the cost and supplying of labor in these troublesome labor times is properly deemed ample responsibility for the superintendent. This distribution of duties, in line with the general tendency of the age to differentiate the duties of the laborer and the under executive, as well as to integrate between wider limits the responsibilities of the fewer and more powerful higher executives, has resulted in many benefits and some colossal errors. It has required the superintendent to be more a reader of events and men, while the engineer becomes more concerned with new devices to harness nature.

The Bessemer process, by inaugurating the general policy that each process is the servant of the succeeding process, made the furnace the servant of the converter, and the converter of the rail mill; and in the other direction the coke oven and the ore mine bore the burden of the furnace superintendent's criticisms. A marked instance of this is told by a Mr. C., who ran the furnaces for a large plant in the middle West. At one time, he was being hauled over the coals rather roughly by the owner, because the mill was not getting the silicons it wanted. At last in petulance he said, "Are there no rights of the furnaces that the mill is bound to respect?" The answer received was final, "Not one." Such a condition of affairs made the furnace superintendent's prestige depart, and his responsibilities are aptly described by one manager as being limited to the coke-barrow and the tapping-hole. On the other hand, the mechanical engineer and accountant came to the front.

Four Important Steps of Progress.

On the strategic side we find, whereas formerly the ownership of a good ore property and a good location near the market was supposed to be all that is necessary for manufacturing independence, now, one should own the cars, coke ovens, coal mines and frequently the railroad and the stone-quarries, as well as the plant of your former purchaser. Therefore, at the plant not independent of fuel supply, or whose fuel is expensive, fuel-economy is the first consideration, while at the plant in a disturbed labor market, labor-saving devices are of a paramount importance, and at the plant which controls the market, the size of the output is the first virtue. Obviously, with such a variety of aims the chief requirement of one plant may be of secondary importance at another.

In looking over the development of furnace practice, four steps or incidents appear as the more important factors: (1) The use of waste-gas under boilers; (2) the heating of the blast; (3) the use of coke as a fuel; and (4) the use of Lake ores. Each of these steps has resulted in a doubling and trebling of the output which was possible before their introduction. Of course, improved refractory materials and better engines were essential, as was also a knowledge of chemistry, but these influences should be regarded as secondary and logical sequences to the others. The better application of the knowledge classified under these four heads represents the development in America.

A decade ago lines of furnaces and cooling devices occupied the thoughts of the furnace world. Since then the advances made may be classified as follows: (1) Conveyors and other mechanical improvements. (2) Metallurgical by-products. (3) Miscellaneous.

Mechanical Conveyors.—The use of Lake ores increased tonnage so rapidly that the simple handling of ore, coke and stone became a serious problem, and, as the properties became more and more under one control, the unnecessary moves of ore into boats to be unloaded onto docks, and to be again reloaded, were reduced. Steam shovels, like the Marion, Bucyrus and the Thew, were used to dig the ore out of the mines and to transfer it from the stock pile into the car. Messrs. Hulett, McMyler, Hoover & Mason, and the Brown Hoisting Machinery Co., devised means of economically unloading the ore from vessels of many hatches. By means of these devices, and large piers at the shipping points, the hours when the boats were idle were minimized.

The rolling mill principle of keeping the passes of the rolls full of metal, and the transportation-virtue of keeping as many trains to the mile as is compatible with safety, was applied to the movement of the raw materials from the mines to the furnace. The steel cars reduce the cost of unloading by their steep bottoms, and these, with the bin-system, as at Duquesne, and car over-turners and bridges, as at Youngstown, represent the chief changes in the matter of handling raw material. Mr. Axel Sahlin, in our *Transactions*, has comprehensively sketched the general points of mechanical transportation in detail, and it is therefore not necessary to enlarge upon them in this paper. In moderate climates, where labor is expensive or troublesome, the devices have frequently paid well, and are sometimes necessary where the season for bringing the ore from mine to furnace is limited. Personally, I think that the skip hoist, the last labor-saving step before the raw material enters the furnace, has not infrequently been introduced where the double-ring bell would have been better; this restriction, however, is not applicable to the general run of Lake ores.

Messrs. Walter Kennedy, M. A. Neeland and E. G. Rust designed skip-hoists which may be regarded as representing the three types. Mr. Walter Kennedy's descending bucket passes at the side of the ascending bucket, and acts to some extent as a counter balance; in the hoist of Mr. Neeland, one bucket only is used, and in that designed by Mr. Rust, the ascending and descending buckets pass over and under each other.

Use of Wash Ores.—Mr. Firmstone showed me some charts of silicon and sulphur in basic metal made from wash-ores varying from 10 to 12 percent silica, which in their regularity and percentage of off-cast compared very favorably with the best practice in Pittsburg. The furnace using these ores was equipped with a double-ring bell. I believe that such regularity with material of this character will astonish most of the Pittsburg iron-makers.

Valves.—In the question of valves, some attempt has been made to improve on the Mushroom and Berg valve-seat, the Spearman and Kennedy burner, and the cold-blast valve; save that they are made somewhat thicker and larger, they are substantially as they were a decade ago. The cutting action of Mesabi ore has suggested the multiplication of false seats and flanges on the stoves.

Tap-Hole Gun.—The Vaughn gun makes the work of stopping the hole easier on the men and is especially satisfactory if operated by compressed air.

Direct Process.—The extensive adoption of that very important link in the iron-plant—the direct process and the mixer—has suggested the undesirability of carrying a gang of specialized workmen all the week simply to carry out and break the iron on Sunday, when the converter is idle. This condition has resulted in the invention of casting machines.

Casting Machines.—Mr. James Scott and Mr. Uehling have cojointly perfected the Uehling casting machine, which is a monument to their perseverance in overcoming many obstacles. The Heyl & Paterson conveyor uses lamp-black in place of lime, and pressed-steel pans in place of cast iron ones. I have always found the electric breaker at Duquesne, if used in con-

*From a paper read at the Atlantic City meeting, February, 1904, of the American Institutetof Mining Engineers.

nection with the iron chills, less expensive and more satisfactory, though the iron cast in it is not so easily handled nor so attractive in appearance. Pig iron casting machines require more attention and are more easily thrown out of order than the electric breaker. Besides the above mentioned there are the Davies and Aiken pig iron casting machines, whose merits commend them to some. The iron chills were necessary because of the rapid growth of the basic process, in which sand and silica are most objectionable materials. In addition, the use of iron chills saves the labor of molding the pig bed in sand, and from them the idea was extended of making the runners and the skimmer of iron; the latter to a great extent doing away with boils.

Slag-Car.—The Weimer slag cars, lined with iron thimbles, have been introduced practically to the exclusion of all others.

Slag Disposal.—In a few plants the slag is run into pits and granulated, and then lifted onto cars by means of cranes and orange-peel buckets. This method is very economical and is especially applicable when it is necessary to dump the cinder at a great distance from the plant, more especially if it can be utilized for manufacture into cement. One disadvantage of granulating the slag is that it may cause annoyance by creating a cloud of steam at the time of casting the iron. In some plants the slag is run into dishes, or metal pans, working on a conveyor, and after it cools it is broken up and carried away for use as railroad ballast, a method which is advisable if the slag is non-slacking.

Recording Gauges, etc.—The introduction of more recording gauges for steam, air blast, vacuum pressure, and temperatures of blast and escaping furnace gases, marks the advance of furnace practice into a state of better control. The extensive introduction of the direct process and the pig casting machine has, in a few cases, caused the abandonment of the cast-house, except a small building which is required to cover the cinder and the iron in their passage to the ladles.

Dust Pockets.—The use of Mesabi ores has made an increase in the number of dust pockets on the gas main. These pockets as well as the dust catcher are now suspended above a track, so that when the pockets are dumped the dust will fall into the cars which have been run underneath them.

Ladle Drying.—The iron ladles, in the absence of natural gas, are frequently dried out by burning the blast furnace gas brought to them in a small flue.

Gas Flues.—In a few American plants the gas flues are not lined with brick, but the great majority use cheap firebrick and do not copy foreigners in this practice. At some places, as at Braddock, a satisfactory water-seal valve is used to isolate a furnace from others on a common system of gas flues, for which purpose the Rothoff valve is extensively used.

Gas Mains.—Almost all gas mains are now overhead, and underground mains are avoided. Not only is the steam system universal in the modern plant, but the tendency is to make the gas flues universal. If one of the furnaces is cold and its gas, therefore, not suited for stoves, the gas from the three other furnaces in the system will help to maintain the stove heat on the one that needs it; in a similar manner the gases from the many furnaces tend to keep the steam pressure regular.

Boilers.—The introduction of water-tube boilers marks the further attempt to obtain the full power possibility of the escaping gas; the Babcock & Wilcox, the Sterling, the Cahall being those the most generally adopted. The numerous water softeners, generally based on the principle of having the carbonates precipitated by lime and the sulphates decomposed by soda, have enabled water-tube boilers to be more extensively introduced. The old idea that because there is an excess of gas and on account of the ease with which scale can be removed, cylindrical boilers should be used, has passed away.

Use of Compressed Air.—Compressed air in place of steam is being quite extensively used for such purposes as the operation of the furnace bell and the mud gun. It does away with the danger of burning the men and of having the water condensed around the tapping hole and freezing around the furnace top.

Steam Pressure.—The economies in the use of blast furnace gas have become so extended that we now economize also on the steam obtained from the gas. In place of the 80-lb. pressure of 12 years ago, and the 60-lb. pressure of a decade earlier, we now use from 120 to 150 lb. steam pressure in connection with compound engines, condensers and feedwater heaters. The engines are of heavy frame and the air valves are positive acting, which gives a higher efficiency of delivery.

Without the modern engine equipment it is probable that the present phenomenal outputs could not have been attained. Despite the fact that a finely divided ore is reduced more rapidly than a lumpy coarse ore, its use requires a greater blast pressure, and a larger volume of blast, else its fineness will not be taken advantage of; therefore, if the increased pressure and volume could not be supplied, the output would be smaller than when using lump ores. I remember visiting a plant where this fact was not appreciated by the owner. It had too many engines and too many boilers, but the furnace could not get a sufficient quantity of blast to satisfy its hearth area. The steam pressure was only 60 lb. per sq. in. and the blast pressure only 12.

The Southwark Foundry & Machine Co., the E. P. Allis Co., the shops of the Wm. Tod Co., and, latterly, several others have met the new conditions. Not, however, without some tribulation, for a 100-ft. furnace requires more work to be done than a 90-ft. one. This latter dimension is in my opinion metallurgically more desirable.

The hoist engines in the majority of cases remain extravagant users of steam. Several plants have intrduced electricity to operate the hoist.

In a few plants happily designed, where the height of the furnace is not over 90 ft., there is a surplus of steam obtainable from the furnace gas after supplying the power demands and the stove demands. These plants sell the surplus steam to the adjacent mill. In many other plants the increased blast pressure resulting from the excessively height of the furnaces or other conditions have nullified the steam economies resulting from the improved machinery. In some instances it has been deemed advisable to use the surplus gas to attain a higher temperature of blast (with the view of having a lower fuel consumption), rather than to sell it to the mill.

Hot Blast Stoves.—In hot blast stoves, the bottom rings are now made of such a height that the riveting on of door frames, ports and branches is done without crossing a seam. These plates are also made very much heavier than formerly because of the higher blast pressure now used. Stoves of the central combustion chamber type seem to be gaining in popularity, and brick specially shaped for the checker work continues to be extensively used.

Refractory Brick.—The brick manufacturer has been fully abreast with the requirements, and supplies a cheap brick for the ladle lining, and a brick free from iron suitable to withstand abrasion for the furnace top, and one free from alkalies and bases for use with high heats. Prior to the year 1890 a blast furnace campaign lasted from 18 to 30 months, now it exceeds eight years, and several furnaces have produced more than a million tons of pig iron with one lining, which has reduced the relining charges per ton of iron produced from 50 cents to less than 15 cents.

Shields.—A number of shields and protectors have been devised to protect the lining of the upper part of the furnaces from the abrasions of the stock rolling off the bell against the top walls. Of these that I have seen, the best is a suspended sheet of heavy rolled steel, which was introduced by Mr. Firmstone at one of his plants. As used by him, an annular opening extending completely around the furnace top was obtained for a gas outlet.

Water Cooling.—At many plants having a small supply of water, a wooden waterfall is used for the purpose of cooling the condensing water for repeated use.

By-Products.—There has been a rapid growth in the use of slag cement which is placed on the market under the name of "Puzzolini," a name derived from the natural cement rock of Italy. Slag cement is used as a substitute for Rosendale cement for purposes not requiring the highest degree of reliability. Among other places, it is manufactured extensively in Chicago, Ill., Youngstown, O., and at Sparrow's Point, Md. The process of manufacturing slag cement has been frequently

described, and is being so improved that its consumption will probably increase. In charcoal manufacture ammonium acetate and wood alcohol are obtained as valuable by-products, and the by-product coke ovens yield ammonia, tar and gas. Each of these subjects is worthy of an individual monograph, especially the by-product coke oven, with its promised economies, both in fixed carbon, yield and labor.

Flue Dirt.—The loss of flue dirt, in the treatment of mixtures containing a high percentage of Mesabi ore, has suggested the use of gas washers and briquetting machines. The Steese and the Roberts washers are those in most general use. The Henry S. Mould briquetting machine has been introduced at several plants to recover the ore that has been blown over from the furnace. The loss through flue dirt can unquestionably be lessened by the study of the conditions outlined in my recent paper in our *Transactions*, "Flue Dirt and Top Pressure in Iron Blast Furnaces."

Saving of Gas.—The introduction of a double bell, preventing the issuance of gas during the lowering of the charge, has resulted in a saving of from 10 to 15 percent of the gas. At several plants using a single bell the average time during which the bell was open exceeded two hours and forty minutes.

Blast Furnace Working.—Impressive as is the metallurgical practice in America, it exhibits inventive ability less than natural resource. We owe more to the regions named after that emissary of peace, Pere Marquette, and the tribes he went out to civilize and Christianize (Menominee and Gogebic), than we do to original research. It is true we have the Uehling pyrometer of American origin, which is an instrument of great precision and of great value to the furnace man. Our records, however, are characterized by bold application rather than new ideas.

Our high furnaces do not reflect great credit on their designers, though in justice it should be said that most furnace men were not in favor of 100-ft. heights. I have personally inspected more than sixty furnaces, and I find that the fuel consumption, other conditions being equal, is lower on furnaces of from 70 to 80 ft. in height than on furnaces exceeding 90 ft. While Dr. Egleston's records do not include any very high or very large furnaces; the best fuel consumptions he quotes are in furnaces in the neighborhood of 75 ft. in height.

With very irregular ore or fuel and very expensive coke, it is a question whether a very large output per furnace is desirable. A bad cast if small is more easily taken care of by the mixer than a very large cast. The principal reasons, however, why our fuel economy has not improved (in fact it has gone backward) are as follows: The coke ovens have been insufficient to meet the increased demand, and in order to increase production, the time of coking was shortened, which has resulted in a poorer quality of fuel. Then again the shortage of cars has caused many furnaces to be repeatedly banked, which has consequently increased the coke consumption. Many cokes formerly considered too high in ash, and therefore low in carbon, have been put on the market. Finally, the furnace mixtures used have been leaner.

The stove heating capacity has not kept pace with the blowing power, consequently lower temperatures of blast were used, resulting in a higher fuel consumption. In several instances it profits, to use the furnace gas for making more blast, rather than to save the coke, by using a high temperature of blast.

Generally speaking, the silicon requirements for Bessemer iron have been lower, depending upon the location of the plant and other conditions. The average percentage of silicon may be taken at 1.1 percent in summer and 0.9 percent in winter. The lowering of silicon demands has been in the furnace man's favor. A brisk market also has lessened the severity of the demands of the mill in sulphur. I think in some quarters there is a greater tolerance of sulphur than existed 10 years ago. In other quarters the metal must be remelted if it exceeds 0.05 percent sulphur.

Owing to the improved preparation of raw material, the furnace man is supposed to be able to keep the sulphur down without the use of manganese, and as high manganese percentages, through the great spluttering they occasion, prevent the forcing of the work in the converter, this element is a greater detriment in iron ores than it was in the beginning of the past decade.

The increased purchase of ore containing a higher phosphorus content has accompanied the rapid extension of the basic open-hearth steel process. It is not unusual upon the shutting down of the converter on Saturday afternoon, while the metal is being run into the chills or through the pig casting machine, to put a basic mixture in the furnace, a procedure which is especially desirable if the furnace capacity of direct process metal is sufficient for the converter capacity and need not be supplemented by remelting the Sunday's product in a cupola furnace. The direct process, with the great advantages afforded by the closing down of the cupolas, has been greatly extended, and molten metal in Pittsburg and Cleveland is carried in 20-ton cars for more than a distance of five miles.

The use of multiple tuyeres has not always been attended with satisfaction, and a more conservative estimate of their benefits now prevails.

The drying of furnaces preparatory to "blowing-in" is now much shorter in time than was the practice a decade ago, many thinking a week quite sufficient. During the blowing-in period the burden is now increased more rapidly, and the quantity of wood used is very much less than formerly. I know a very successful operator who uses no more than a cart load of wood for blowing-in a large furnace, and a few who light the furnaces in starting by means of red hot iron bars introduced through the tuyeres, while the blast is on. Red hot charcoal also is satisfactorily used by some who blow it through the tuyeres during the starting of the blowing-in. The hot blast stoves can now be heated higher previous to starting than was formerly practicable, owing to the use of natural gas or the universal gas main.

A saner treatment of the tap hole now prevails, due to the recognition that an exceptionally large product for a single day means little, and as a consequence the last portion of iron in the crucible is not drawn out by long prolonged blowing at the tap hole. The blowing at the tap hole leads to break outs, on account of the heating up of the furnace front.

The blowing away of furnace bell and hopper by slips, which frequently occurred after the introduction of Mesabi ore, are now unusual. This usually disastrous irregularity was then attributed to a so-called dust explosion, but I think this assumption is wrong, and the irregular working, even with high percentages of Mesabi ore in the charge, can be obviated.

The proportion of Mesabi ore used in the ore mixture has, in exactly a decade, increased from 25 to 100 percent, a furnace in Pittsburg having been blown in recently with the ore mixture composed entirely of Mesabi ore.

While the ingenuity of American metallurgists savors less of the lamp than that of European engineers, still in the recognition that fine ores are quickly reduced in the furnace (analogous to the manner in which salt enters more readily into a solution if the more finely divided, and its corollary, that a finely divided material must be given a large volume of solvent in order to dissolve it rapidly); and by applying this principle American engineers have acted with great promptness and received enormous returns.

Blast Furnace Gas Engines.

The introduction of gas engines at the Buffalo plant of the Lackawanna Steel Co. has marked an important epoch in blast furnace practice. By eliminating boilers, and thus combining the duties of boiler and blowing engine, economies are promised amounting to 20 percent. Through the courtesy of Mr. Wehrum, formerly the general manager of the Lackawanna Steel Co., the following data on the company's gas engines have been contributed:

"The distribution of the units of horsepower power of blast furnace gas engines installed in Europe prior to February, 1902, was:—England, 600; Italy, 1,800; Russia, 2,230; Austria, 2,840; France, 7,400; Belgium, 7,600; Luxemburg, 15,400; and Germany, 44,665; making a total of 82,535 h. p.

"Blast furnace gas in gas motors is 37 percent higher in efficiency than that used to produce steam, and I estimate that the engines introduced at the plant of the Lackawanna Steel Co. under my administration show an economy of fully 300 percent more than that of the single condensing steam blowing engines, which is equivalent to a saving of $12.50 per horsepower per year, by the introduction of blast furnace gas motors. Gas engines are now installed and in operation at the

Buffalo plant of the company to the extent of some 5,100 horsepower."

The above mentioned quantity of horsepower (82,535) has since been increased to 297,050, which is distributed among the various gas engine makers as shown in Table I.

TABLE I.—BLAST FURNACE GAS ENGINES (EXCEEDING 200 H. P.) COMPLETED OR IN COURSE OF CONSTRUCTION OCT. 31, 1903.

Name of Maker.	Deutz.	Koerting.	Nuernberg.	Oechelhauser.	Cockerill.	Total.
Number of Engines.....	123	70	57	41	116	407
Total Horse Power.....	49,225	83,475	61,350	27,400	75,600	297,050
Average Horse Power..	400	1,192	1,075	667	652	730

Considering the fact that about two-thirds of the gases are now used for the production of power and one-third for heating the stoves, the subject is well worthy of study.

Mr. Uehling makes a statement, that for each ton of pig iron produced per hour there will be available 800 h. p. for sale or for use in connection with the rolling mills connected with the blast furnace plant, and Mr. F. duP. Thomson, who assisted Mr. Wehrum at the Lackawanna Steel Co.'s plant, is of the opinion that 500 h. p. per ton of pig iron produced per hour would more nearly approach practical working.

The blast furnace has always been regarded as representing a high degree of efficiency. In the direct process, the heat contained in the molten iron has been saved, and doubtless ere long the heat of the molten slag also will be utilized. But it is in the line of using waste gases that our signal economies have been scored. First, in using it under the boilers, then, in using it under the stoves, then, in sealing the top of the blast furnace with a double bell, then, in selling the excess waste gas to the mill in the form of steam, and now, after continuously demanding more from it, we hope to receive more by the introduction of gas engines.

In the Metallurgical Congress, which I suppose will form a part of the Louisiana Purchase Centenary, it will be appropriate to record the progress of that plant of unrivaled natural resources, viz., the Colorado Fuel and Iron Co., situated in what was then the great American Desert, and what is now one of the greatest coal fields and ore deposits of the world.

Although our coke consumption remains between 1,750 and 2,100 lb. per ton of metal produced, our daily output per furnace has jumped from 350 to 500 tons and more in a decade, and the total yearly output of pig iron, according to Mr. Swank, has grown from about 8,000,000 tons to 18,000,252 tons in 1903. This rapid increase in the production can be understood when it is known that one 500-ton furnace has been erected and produced iron within one year and one day after the pick was first driven into the ground.

In the iron world it has been proven that high wages need not mean increased cost of production. The region between the Great Lakes and the Connellsville coal field is still regarded as being a section where the most advantages are found, possessing easy access to high grade cokes, the best ores, the most skilled and ambitious labor, the greatest mechanical ingenuity and the best markets. Colorado and Alabama also hold strong positions.

While the decade has recorded the abandonment of many plants economically unfit, it has been a period of great activity in building new plants in the localities above mentioned as well as in Canada and Mexico. The tendency has been towards fewer units and larger units, towards a keener appreciation of the reduction in cost resulting from using a large output as a divisor, particularly with reference to the reduction of the cost of management and fixed charges.

A series of observations by barometer and hygrometer emphasize the disadvantages of high humidity, and have led in a few instances where there were hot, moist engine rooms to the supply of air from outside the building by means of especially constructed pipes. This also is a line of investigation receiving the attention of some of our foremost furnace managers.

I cannot close this brief record without the mention of the one who I think has most clearly discerned the trend of events —Mr. James Gayley early saw the possibilities of Mesabi ores and the methods of handling them, as he also saw the advantages of a low bosh and a large hearth. Both in justice and with a sense of personal loyalty, I feel that the name of Mr. James Gayley should be placed permanently among those who have contributed so much to the splendid development of the blast furnace practice during recent years.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Interstate Woven-Wire Fence Co., Indianapolis, Ind., has been incorporated with a capital of $25,000. The incorporators are: George W. Whittington, John A. Von Spreckelsen, and Charles J. Greeley.

The Phail-Krueger Foundry & Machine Co., Brooklyn, N. Y., has been incorporated with a capital of $30,000. The directors are: George A. Phail and Minnie L. Phail, Flushing, and F. E. Krueger, Douglaston.

Robert T. McMurray & Bro., New York, have been incorporated with a capital of $20,000 to manufacture iron and steel work.

The Gray's Harbor Iron Works Co., Hoquiam, Wash., has increased its capital stock from $30,000 to $50,000, and will add to its equipment.

The Carnahan Stamping & Enameling Co., Canton, O., has been incorporated with a capital of $300,000. The incorporators are: Millard F. Taylor, Henry C. Milligan, David B. Day, Austin Lynch and William L. Day.

The Snell Motor Car & Truck Co., Toledo, O., has been incorporated with a capital of $125,000. The incorporators are: Samuel Snell, Fred C. Avery, Roy H. Spencer, Charles A. Kellar and Martin S. Dodd.

The International Machine Co., Adrian, Mich., has been incorporated with a capital of $50,000.

The American Steel Tie Co. has been organized at Sandusky, O., and incorporated with a capital of $100,000, by Leslie H. Webb, O. C. Ringle, Fred H. Peters and Arthur Bradley, of Cleveland, and Thomas McGeachie and John Kelly, of Sandusky. The company will manufacture the steel tie patented by Messrs. McGeachie and Kelly.

A new company organized at Dunlap, Ia., by business men of that city will soon begin the manufacture of a new patent stovepipe. Charles A. Overton, the inventor, will have charge of the plant and Hiram A. Kellogg will be business manager.

Wallace & Adock, Hopkinsville, Ky., want prices on 60 x 16 boiler and 60 or 75-h. p. engine.

T. G. Aultman Steam Pump Works, Fairmont, W. Va., will buy 30 by 30-inch by 8-foot planer, 24-foot by 16-foot or 18-foot lathe, and 25 or 26-inch drill press.

Bureau of Supplies & Accounts, Navy Department, Washington, D. C., will open bids March 1 for furnishing at Norfolk, Charleston and Port Royal navy yards, a quantity of electric blowers, electric fans, traveling cranes, split pulleys, railroad track tools, foundry cupola, etc. Blank forms furnished by Navy Pay Offices, at Norfolk, Va., Charleston, S. C., and Port Royal, S. C.

Columbus Iron Works Co., Columbus, Ga., turns out ice machines, cane mills, grate bars, general castings, etc., and wants to add some line that will keep its plant in full operation at all times.

J. A. Street Co., Citizens' Bank Building, Norfolk, Va., wants hoisting engines with boilers, 12 by 14-inch cylinders, second-hand, in good condition.

D. L. Caxsey Machine Co., Springfield, O., wants air compressor with 8-inch cylinder, steam driven preferred.

A. V. Kaiser & Co., 222 S. Third street, Philadelphia, Pa., will buy 500 tons of 30-pound relayers with fish plates complete, also 80 tons of 25-pound relayers; and several contractors' hoisting engines and wire rope.

John Davis, 81 Haverhill street, Boston, Mass., wants two horizontal tubular boilers, five or six feet diameter, for 100 pounds steam.

The Wabash railroad will expend $50,000 for installation of additional new machinery in its shops at Moberly, Mo. J. S. Goodrick is division superintendent.

The Headson Tool & Mfg. Co., New York City, has been incorporated with a capital of $100,000 to manufacture machinery, tools, etc. The directors are: F. A. Headson, Lafayette, Ind., L. J. Lippmann, T. K. Wegman, New York City.

The McCauley Machine Works Co., Portland, Ore., has been incorporated with a capital of $5,000. Incorporators are:

R. E. McCauley, C. J. Freeman, T. A. Fleischhauer.

The Defiance Tool Mfg. Co., Defiance, O., has been incorporated with a capital of $25,000. Incorporators are: M. A. Horn, A. C. Getz, F. P. Weisenberger, F. J. Papenhagen and T. T. Ansberry.

The Davis foundry, Hornellsville, N. Y., has been incorporated with a capital of $20,000.

The Silberman Iron Co., Cleveland, has been incorporated with a capital of $50,000. Incorporators are: Aaron Rotter, John W. Edwards, Harry Silberman, Harry Pott, Albert Maska. The company will deal in scrap.

Fires and Accidents:—

Three men were killed and several seriously injured Feb. 21 by an explosion of blast furnace gas at the plant of the Lackawanna Steel Co., Buffalo.

The foundry of the Root Bros. Co., Plymouth, O., was destroyed by fire Feb. 10 with a loss of $10,000; insurance $7,500. The company intends to erect a brick foundry 125 x 60 feet and is in the market for new equipment.

The Jordan Foundry Co., of Oklahoma City, Oklahoma, was partially destroyed by fire on Sunday morning, Feb. 14, damage about $5,000.

New Construction:—

The American Wire Cloth Co., recently organized at Clinton, Ia., with a capital of $60,000, will erect a plant in that city. The main building will be 60 ft. wide, 100 ft. long and three stories high. It is expected that it will be in operation by Sept. 1. The following officers have been elected: C. F. Curtis, president; James Peterson, vice president; M. J. Gates, treasurer; E. E. Reynolds, secretary and manager.

The Republic Building Co., Cleveland, recently incorporated with a capital of $500,000, contemplates erecting a power building of ten floors, suitable for light manufacturing.

The National Wire Corporation, New Haven, Conn., has taken out permits for the erection of five more buildings. One of the buildings will be a two-story brick structure, 82 x 206 ft., with a wing 14 x 40 ft. It will be used for making wire Another two-story brick structure will be used for the manufacture of nail machines and reels. Its dimensions will be 52 x 182 ft. Another brick structure will be 64 x 142 ft. and three stories high in the main part, and there will be a one-story section, 64 x 221 ft. A fourth building will be of brick, 42 x 42 ft., with a wing 23 x 23 ft. It will be devoted to mill-room and time office. The fifth structure will be a one-story wooden building, 84 x 363 ft., and will be used for the making of fence and wire nails.

The Russell & Erwin branch of the American Hardware Co., New Britain, Conn., is planning to extend its facilities. An addition will be built to its seven-story building.

The Chattanooga Plow Works, Chattanooga, Tenn., will erect an addition 132 x 164 ft. This concern was organized in 1883, and has grown from a blacksmith shop to a large and most progressive enterprise.

Montgomery & Son, machinists, are erecting a machine shop at Bellaire, O. The frame of the building is well under way.

As soon as the weather permits the foundry connected with the Burns Boiler Works, De Pere, Wis., will be completed. The foundation for the foundry was laid before cold set in last fall. It will be 57 x 150 feet, and it will be equipped with thoroughly up-to-date machinery.

The Link Belt Engineering Co. will erect a one-story brick pattern shop building, 40 x 96 feet, at Hunting Park avenue and Reading railway, Philadelphia. The cost will be $4,000.

The directors of the Racine Steel & Iron Co., which recently increased its capital stock to $500,000 and consolidated with plants at Grand Crossing, Ill., Crawfordsville, Ind., Columbus, O., and South Bend, Ind., have decided to double the capacity of the plant and employ 300 additional men.

The Messinger Mfg. Co., Tatamy, Pa., is building a new foundry 80 by 192 feet.

The Wichita Bridge & Iron Co., Wichita, Kan., is improving its plant, including additions to both machine shop and foundry. It expects to spend about $25,000.

The Goubert Mfg. Co., of New York, is to build a new plant at Bayonne, N. J. There will be four new foundry buildings, one 70 by 310 feet, and three each 60 by 310 feet. Several other buildings are also to be erected.

The Rogers Iron Co., of Springfield, O., expects to erect a new foundry building in the spring.

The Maysville Foundry & Machine Co., of Maysville, Ky., will build a brick addition to its plant, 60 by 75 feet and install a number of improvements.

The Southern Street Car Mfg. Co., whose organization was recently announced, has let the contract for the erection of the first building for its plant. The structure will be 150 x 250 feet, of structural steel, foundations of concrete. W. G. Pilkinton, Birmingham, is president of the new company.

Plans for the proposed steel viaduct to be erected by the citizens of Atlanta, Ga., over the Southern railroad tracks, have been completed. Bids will soon be callled for. About $75,000 will be expended.

Henry Stenzle will build a foundry and machine shop at Lazaerville, W. Va.

The American Gas Machine Co., Albert Lea, Minn., has traded the building and lot it now occupies for two lots adjoining and will erect a two-story building, 32 x 100 feet, on the new site. The large demand for the company's product has made necessary the erection of a larger plant.

A. M. Sanders & Sons, of Reedsburg, Wis., are planning to add a foundry to their shop at some time in the spring.

The Shirley Radiator & Foundry Co., with general offices at Indianapolis and a foundry at Shirley, Ind., has just completed an additional warehouse 50 x 150 feet and put in a duplicate steam plant, so as to be able to operate its foundry with either gas or steam.

The Chambers Blower & Forge Co., of Lancaster, Pa., has recently erected a new foundry 60 by 350 feet.

The Pittsburg and Valley Districts:—

Furnace C of the Edgar Thomson plant of the Carnegie Steel Co., Braddock, Pa., resumed operations this week after an extended idleness. The eleven furnaces of this plant are now on in full, for the first time in several years, as one or more of the stacks have been out heretofore undergoing repars. Owing to the dull market of the past six months it was possible to make the needed repairs at nearly all the furnaces, which accounts for the operation of all of them at the present time. All the iron made at this plant is used in the steel mill which is operated in direct connection. While the stack has been idle it has been considerably enlarged and many modern improvements have been added.

Provided satisfactory terms can be arranged the plant of the Fischer Foundry & Machine Co. on the South Side, Pittsburg, will be removed to Connellsville, Pa., where the company now owns a large manufacturing site. The present plant is too small and owing to its location it is impossible to make the proper additions. The company is enjoying an excellent demand for its machinery at the present time and with a new and enlarged plant will be in position to fill orders more quickly than is possible at present. The board of trade of Connellsville has appointed a committee to confer with the Fischer Foundry & Machine Co. officials relative to the location of the plant in their city.

Officials of the American Sheet & Tin Plate Co., of Pittsburg, Pa., last week made a tour of inspection of the company's sheet and tin mills located in Ohio, Pennsylvania and West Virginia. The party consisted of President Graham; E. W. Pargny, second vice president; C. W. Bray, chief engineer; John Warner, and District Managers C. A. Robinson, P. F. Smith, J. R. Phillips, S. A. Davis, B. Goldsmith, Samuel Cooper and Traffic Manager A. G. Young.

Interests identified with the Pittsburg Steel Co., of Pittsburg, Pa., will apply for a charter for the American Seamless Tube Co. It is probable that this company will be subsidiary to the Pittsburg Steel Co. The same parties are also organizing a patents company which will no doubt control the patents under which the tubes are to be made. It has not yet been decided whether the plant will be at Monessen, Pa., where the plant of the Pittsburg Steel Co. is located, but this is the natural location. The incorporators of the two companies are Wallace H. Rowe and Emil Winter, both officials of the Pittsburg Steel Co.

The LaBelle Iron Works, Steubenville, O., has disposed of

the $1,000,000 worth of bonds which remained unsubscribed for after the issue of $2,500,000 worth to a syndicate of bankers at Wheeling, W. Va. The bonds bear interest at 6 percent and were originally sold at 90. The bankers are, however, holding their allotment at 92½. The company's entire open-hearth plant is in operation, but work on the erection of its second furnace is not progressing very rapidly as the iron is not badly needed at the present time. It is probable, however, that it will be ready for the torch in a few months.

The Youngstown Bolt Co., of Youngstown, O., has been incorporated with $650,000 capital, of which $250,000 is preferred and $400,000 is common. The new company succeeds the Youngstown Mfg. Co. and will take over the latter's plant at Struthers, O.

A number of machinists employed at the plant of the George B. Sennett Co., Youngstown, O., went on a strike last week. It is alleged that the company machined castings made by the Harris Press Works at Niles where there is a strike in progress.

Joseph Dreifus, formerly of South avenue and Walker street, Allegheny, Pa., has opened an office in Room 330, Park building, Pittsburg. He will deal in iron and steel scrap of all kinds.

Eight furnaces of the open-hearth plant of the Carnegie Steel Co., Sharon, Pa., are now in operation. The remainder of the plant will be started shortly.

Deeds Bros., of Pittsburg, have applied for the appointment of a receiver for the Pittsburg Engineering Co., of the same place. The plaintiffs say that they are creditors of the company in the sum of $14,000 and that the company has accounts due amounting to $50,893.51 and has liabilities amounting to $52,716.80.

The annual banquet of the Engineers' Society of Western Pennsylvania, was held at the Hotel Schenley, Pittsburg, on Saturday, Feb. 20. Emil Swensson was toastmaster.

General Industrial Notes:—

The Tower & Lyon Co., No. 95 Chambers street, New York, manufacturer of mechanics' fine tools and hardware specialties, has increased its capital from $65,000 to $100,000. T. D. Halliwell, who has succeeded Warren Tower as secretary, takes the entire increase of $35,000, and also becomes a director of the company, the balance of the official force remaining as before. The company is preparing to get out many new goods in hardware specialties at the factory, Bloomfield, N. J.

The Cohoes Iron Foundry & Machine Co., capital stock $50,000, has been carrying on business in Cohoes, N. Y., for the last 50 years. It does a general jobbing business in both foundry and machine shop and in addition has several specialties of which the most important are: Slashing machinery for cotton mills; and elevators, hand power, belt driven, and electric. This company's slashers and elevators are very well known throughout the cotton mills of the East and South.

F. B. McCroskey, who for several years has manufactured reamers at 208 Laurence street, Cincinnati, O., has removed to Meadville, Pa., and organized a stock company which will be known as the F. B. McCroskey Mfg. Co. It will continue the manufacture of "The McCroskey reamers" and will also manufacture small tools. The officers of the company are: F. B. McCroskey, president; G. H. Macdonough, vice president; H. W. Reynolds, secretary, and John E. Reynolds, treasurer. Mr. Macdonough until recently was division engineer of the Erie R. R. and H. W. and John E. Reynolds were operating the Reynolds Grill Works, of Meadville. The Grill works plant has been secured by the McCroskey company, the former company having gone out of business Jan. 1. A number of good sized orders for reamers have just been booked.

One of the two blast furnaces of the Illinois Steel Co., at Bay View, Wis., resumed last week after being shut down for several months. It is expected that the other furnace will be blown in within a week or so.

The York Mfg. Co., York, Pa., has secured orders for refrigerating machinery to be shipped to Japan and Argentine Republic.

The Colt Arms Co., Providence, R. I., is reported to have secured a large contract for automatic guns for shipment to Japan.

The Westralia Iron Works, Ltd., has been organized by two Sydney engineering concerns for the purpose of constructing a plant at Freemantle, West Australia, to be devoted to the manufacture of railroad rolling stock.

The Bullock Electric Mfg. Co., Cincinnati, O., recently shipped a large consignment of generators and motors to Japan. The machinery was, however, stopped at Chicago on account of the war between Russia and Japan, as it is feared that the goods might be seized by the Russians if they go over in Japanese ships, and the company is unable to secure any insurance on freight to Japan.

The finest motive power equipment ever received in the republic of Mexico is arriving in the city of Juarez for the Mexican Central railroad. Of the 90 new engines lately ordered from the American Locomotive Works, 20 are being set up at the shops at Juarez. These engines are of special design of the mogul type.

The King Lubricator & Brass Supply Co., Steubenville, O., recently incorporated with a capital of $50,000, will manufacture the King lubricator, invented by Assistant Master Mechanic Clark, of La Belle Steel Co.

The Marysville Chain Works, Marysville, Pa., which have been dismantled, will be moved to Harrisburg, Pa. They have been organized as the Harrisburg Chain Mfg. Co. Arrangements have been made to put the company in operation as soon as possible, and a charter has been applied for.

The board of trade and Merchants' Association, of Poughkeepsie, N. Y., have appointed a committee to raise funds to assist the National Automatic Needle Co. to establish a plant at Poughkeepsie.

The location of the canal to be built by the Colorado Fuel & Iron Co. has been decided upon. The canal will tap the Arkansas river about three miles west of Florence, Colo., and will be about 15 miles shorter than was originally intended. The canal is to furnish water for the steel works at Pueblo, the water supply of which at the present time is inadequate. The building of the canal as at first proposed would have required several years, but under the new plans it will be built in a much shorter time. The company intends to push the work as fast as possible and expects to have water flowing through the canal before the end of the summer.

As a result of the Baltimore fire the plant of the American Foundry & Machine Co., at Hanover, Pa., has been temporarily closed. The financial backing of the shops recently went into the hands of Baltimore capitalists, all of whom sustained losses by the recent conflagration.

Alfred B. Stones and Seth D. Bidwell have leased the Brighton Foundry & Machine Co.'s shop, Brighton, Mich.

The Foundry and Brass Works, of James W. Carr, at Richmond, Va., recently damaged by fire, have been repaired and are again in operation.

Creditors of the Columbia Iron Works, Port Huron, Mich., have chosen the following appraisers: A. C. Pessano, of the Great Lakes Engineering Works; G. Jay Vinton, of Vinton & Co., and E. C. Recor, of St. Clair.

The Advance Furnace Co., recently organized at Joliet, Ill., with a capital of $20,000, will manufacture furnaces and furnace attachments and sell patent rights. The company will not build a plant at present, but will have castings made at foundries already in operation.

Thomas Davis, for many years puddle boss at the Atlantic mill, at New Castle, Pa., has made a proposition to President Thompson, of the Republic Iron & Steel Co., to start the plant which has not been in operation for more than a year. He agrees to pay the company 6 percent on $50,000 and to pay the taxes and insurance on the plant. Mr. Davis proposes, if the offer is accepted, to form a company with iron-workers.

A new blooming mill is to be installed at the Bessemer steel plant of the Carnegie Steel Co., at New Castle, Pa.

The new furnace of the Detroit Iron & Steel Co., below Detroit, was blown in on Monday, Feb. 15, and has made a satisfactory output both as to quantity and quality.

L. C. Tarras is now operating a machine shop in connection with his foundry, which he has operated in Winona, Minn., since 1892.

COCHRANE HEATERS

The argument in favor of a Cochrane Feed Water Heater, which is of the "open" or direct contact type, as opposed to any closed or pressure heater, is conclusive. The Cochrane Open Heater has many decided advantages which a closed heater does not —and cannot— possess. And there are no disadvantages in the Cochrane Open Heater to off-set its advantages.

The Cochrane Heater saves and utilizes all of the heat contained in the exhaust condensed in heating the feed water. The Cochrane Heater purifies the feed supply by saving and utilizing the pure condensation of the exhaust, the live steam drips (through traps) and the returns from heating and drying systems. The Cochrane Heater also purifies the feed water by driving off the gases which hold the carbonates of lime and magnesia in solution, by providing trays and filter beds for catching and holding back the precipitated carbonates and the mud and other solid impurities, and by providing means for flushing off the lighter impurities which rise to the top of the water in the settling chamber. The Cochrane Heater always gives the maximum temperature obtainable from the exhaust—not deteriorating in its heating capacity when fouled up by the impurities taken out of the water. None of these advantages are found in a closed heater.

But this is only part of the story—and not all of the important part, either. For the full comparison between Cochrane Heaters and closed heaters, read our **CATALOGUE 11—H** which is freely sent on request.

Cochrane Heaters are thoroughly well made—best materials and workmanship and first-class fittings being used. And a full, clear, complete guarantee goes with each Heater.

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J. K. Dimmick & Co., Drexel Building	Philadelphia, Pa.
J. K. Dimmick & Co., Murtland Building	Pittsburg, Pa.
J. K. Dimmick & Co., Ellicott Square	Buffalo, N. Y.
Robert Field, 1105 Traction Building	Cincinnati, O.
William Wieman, 605 Citizens Bank Building	Cleveland, O.
E. C. Smith, 506 Commonwealth Trust Building	St. Louis, Mo.
David Evans, 1030 Monadnock Block	Chicago, Ill.
W. H. Palmer, Pioneer Press Building	St. Paul, Minn.
Zimmerman-Wells-Brown Co., 2d and Ash Streets	Portland, Ore.
Hardy Greenwood, P. O. Box 751	San Antonio, Tex.
T. R. Hassam, 1 Calle de las Damas 5	Mexico City
F. S. Walshe, 325 Cadadelet Street	New Orleans, La.
Edwin R. Haas, 37 Prior Street	Atlanta, Ga.
William Jacks & Co., 41 St. Vincent Place	Glasgow, Scotland

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11 PLANTS IN U. S. AND CANADA.

The Buyers' Directory in the back part of this issue is for the benefit of our readers, and should be used by them. It thoroughly covers the lines manufactured by our customers.